AD-A283 290

February 1994

"Fort X" Stormwater Pollution Prevention Plan

DTIC
ELECTE
AUG 1 0 1994
S D
F

AR305RD1

This document has been approved for public release and sale; its distribution is unlimited

Robert J. Baxter
Douglas M. Brown

94-25147

Prepared pursuant to Department of Defense Contract MDA903-90-C-0006. The views expressed here are those of the Logistics Management Institute at the time of issue but not necessarily those of the Department of Defense. Permission to quote or reproduce any part except for government purposes must be obtained from the Logistics Management Institute.

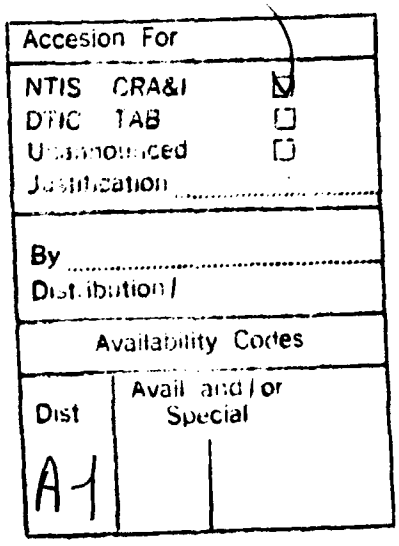
Logistics Management Institute
6400 Goldsboro Road
Bethesda, Maryland 20817-5886

DTIC QUALITY INSPECTED 1

94 8 0[illegible] 056

PREFACE

Readers of this report will quickly identify the facility upon which this "Fort X" model is based. However, it should not be assumed that the conditions represented here are those that exist at the real installation. In order to illustrate the risk-assessment thought process and methodology, we have in some cases created facilities and situations that do not exist, while in other cases we have eliminated real facilities and situations when they confuse the point being made in the text.



CONTENTS

CONTENTS (Continued)

TABLES

FIGURES

SECTION I

"FORT X" STORMWATER POLLUTION PREVENTION PLAN

INSTALLATION OVERVIEW

Fort X is a major Army installation occupying approximately 100,000 acres in north-central Kansas within Geary and Riley Counties. The installation provides support and training facilities for non-Divisional Units, and tenant activities, and a Mechanized Division. The Main Post (one of six cantonment areas located on the southern portion of the installation) is located approximately 65 miles west of the state capital. The other five cantonment areas, also on the southern sector of the installation, are Camp Whitside, Camp Forsyth, Camp Funston, Marshall Field, and Custer Hill.

Fort X is located near the confluence of the Republican and Smoky Hill Rivers, which eventually merge to form the Kansas River (Figure I-1). Fort X expanded during the last 50 years beyond the cantonment areas by incorporating large areas on upland plateaus for use as target ranges and impact areas. The topography of the installation is best described as a low plain eroded by streams and rivers. Upland areas are interspersed with numerous intermittent, perennial streams while lowland sectors are found adjacent to the major rivers indicated previously. Numerous small ponds are found on the installation primarily in the upland areas. Lowland areas are prevalent with numerous waterways. Two large manmade lakes border the installation: Milford Lake on the Republican River in the west and Tuttle Creek Lake on the Big Blue River in the east. Intermittent streams, perennial bodies of surface water, and drainages of the installation are shown in Figures I-2 and I-3. Flooding of installation grounds occurs in the lowlands, along the Republican and Kansas Rivers. The 100-year flood plain does not impact the cantonment areas as depicted in Figure I-4.

Ground water is the primary source of drinking water for the installation. Sand and gravel deposits in lowland areas are prime sources of drinking water from the aquifers within these areas.

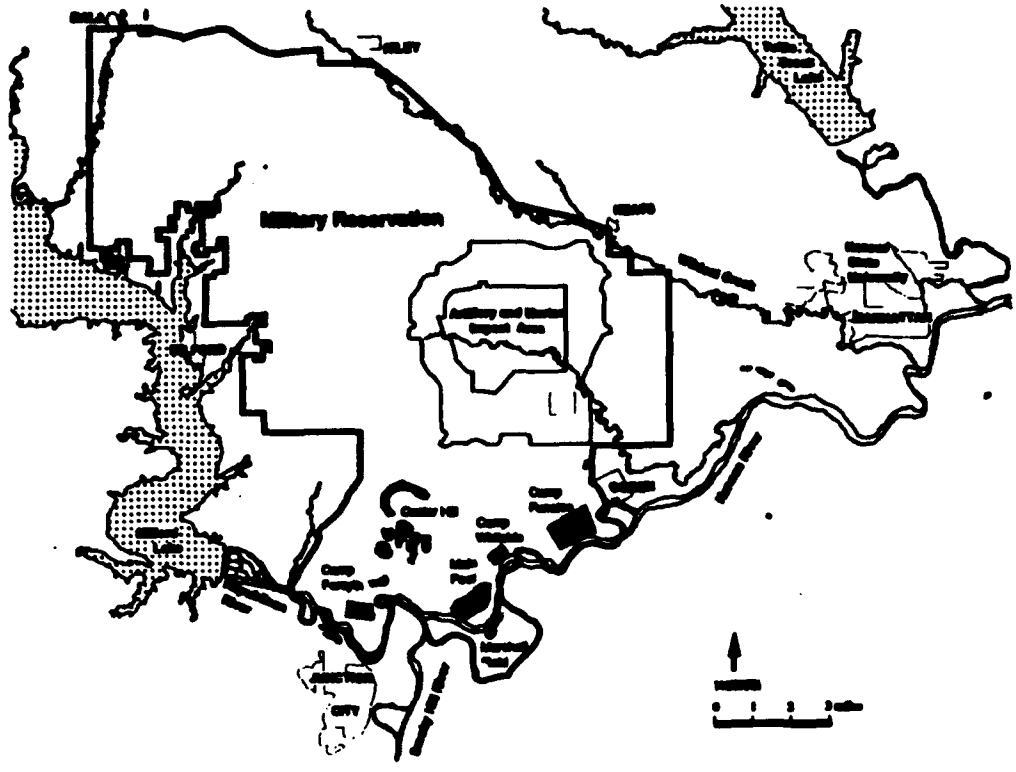


FIG. I-1. FORT X MAP

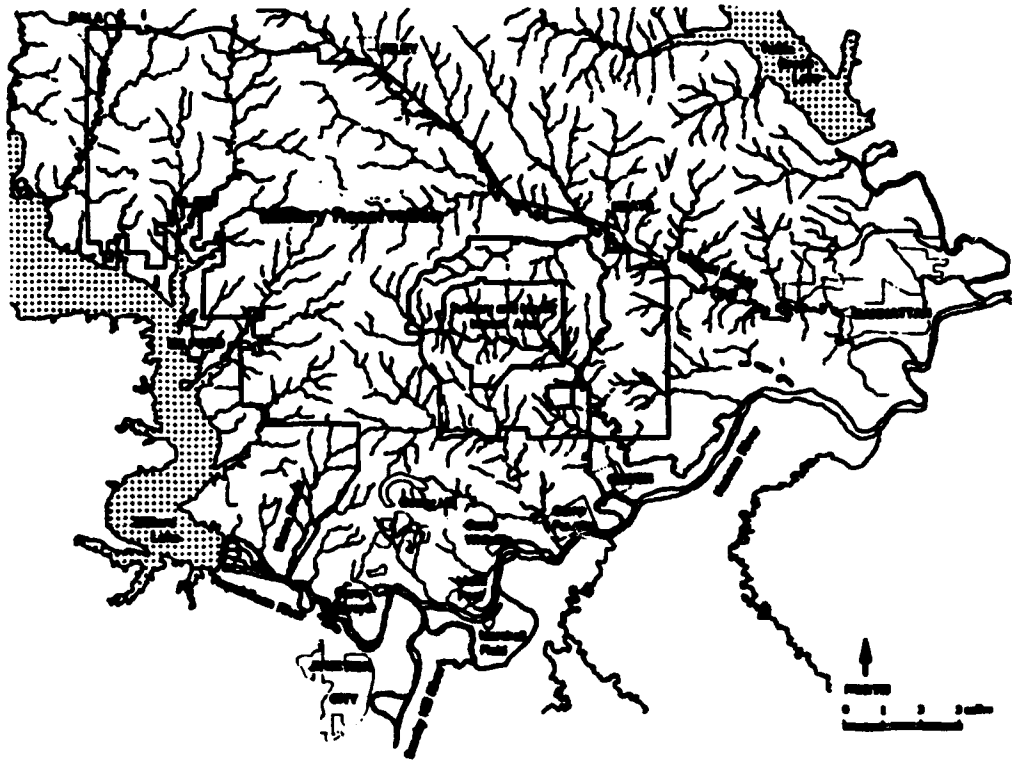


FIG. I-2. INTERMITTENT AND PERENNIAL STREAMS

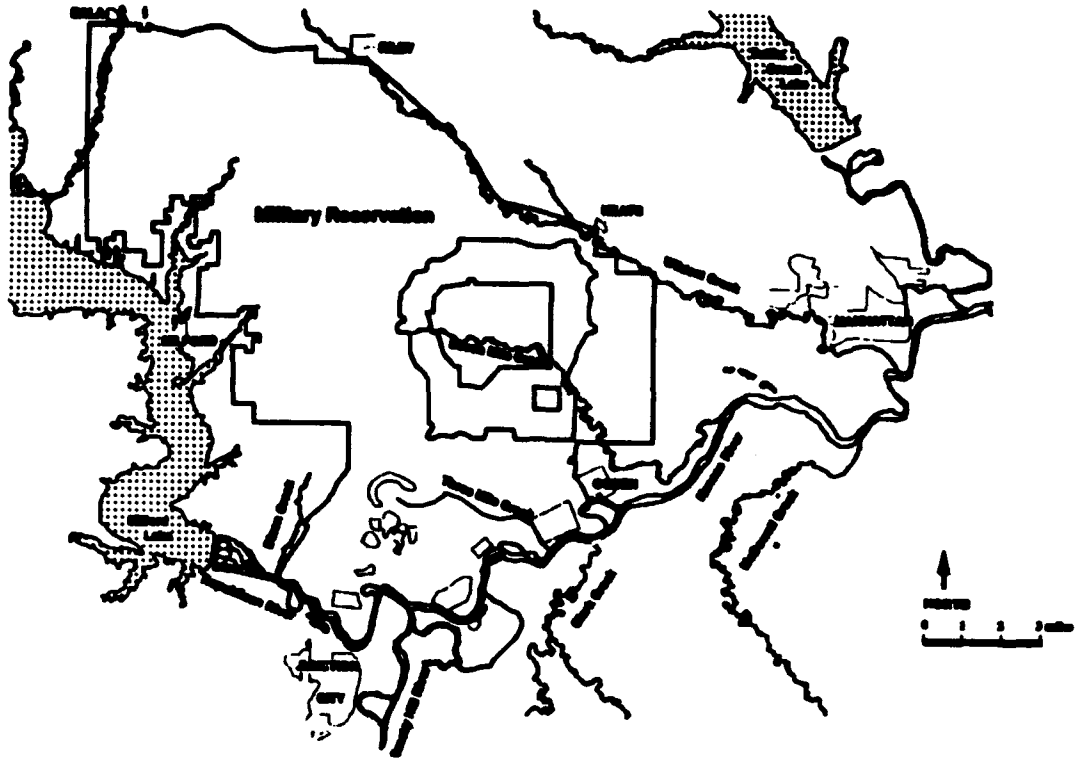


FIG. I-3. PERENNIAL SURFACE WATER BODIES

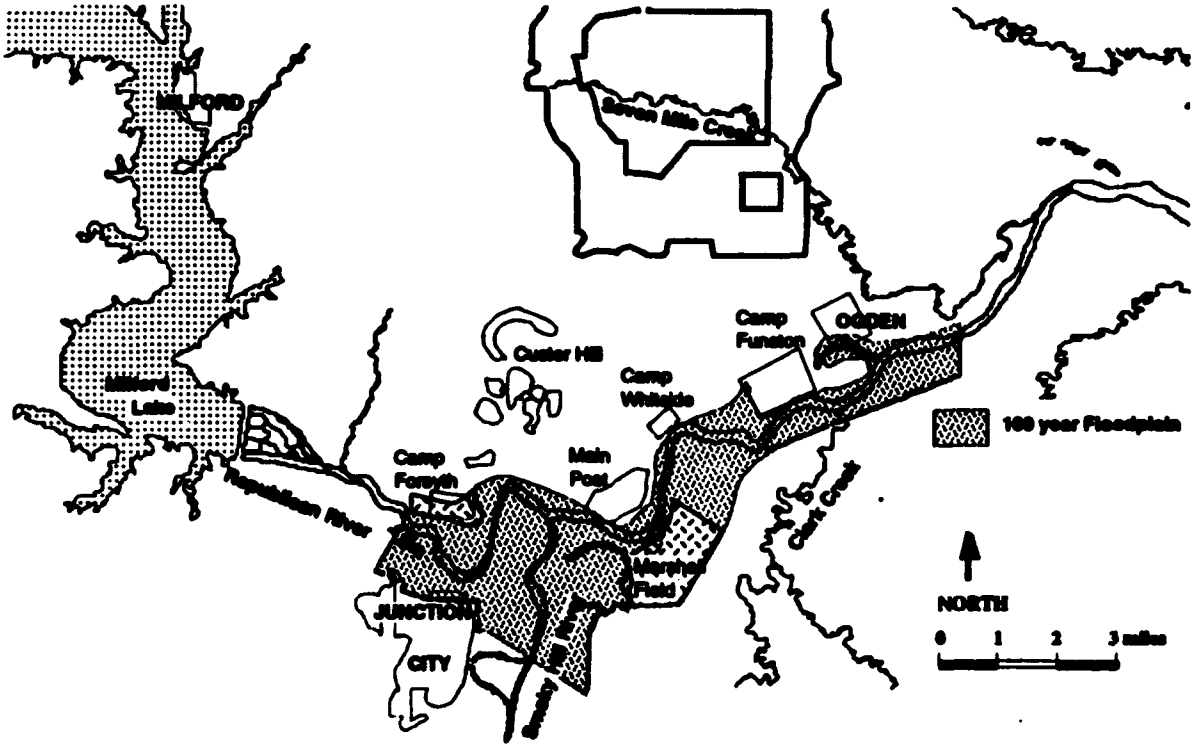


FIG. I-4. 100-YEAR FLOOD PLAINS

The population of Fort X consists of approximately 20,000 military personnel and civilians plus 7,600 on-post military dependents (December 1991 population survey).

Fort X gives the Army the ability to house and maintain an Army division and associated land combat forces. This mission requires a diverse number of tasks. These include administrative, construction, operation and maintenance (O&M), procurement, and training capabilities. The preponderance of Fort X's tasks are associated with the training of military units or O&M of installation property.

The operational history of the installation is characterized by a multitude of industrial activities. During the period between World War I and World War II, a buildup of forces took place at the installation. Military training activities became more complex; motor pools and auto repair facilities replaced stables and blacksmith shops. Marshall Field became operational in 1921 and constructed its own specialized repair facilities. Where previously constructed sewage lines discharged directly into adjacent rivers, sewer lines were extended to transport waste waters to treatment plants. During World War II transportation and industrial activities were expanded. More motor pools were constructed along with underground storage tanks and piping to provide fuel storage and service capabilities. Laundry and dry cleaning facilities, vehicle repair shops, and boiler plants became part of the post infrastructure. Heavy weapons training focused on the main impact area. Small arms ranges were numerous along river bluffs in Camps Forsyth, Whitside, and Funston. The post-World War II era to the Vietnam era is characterized by the advent of new facilities, especially on Custer Hill, in the form of tactical equipment shops.

Prior to this period, solid wastes were disposed of in the most expeditious manner available. Landfills were developed in the camps at Main Post and Funston, Forsyth, and Whitside areas as repositories for waste materials. During the Vietnam era, additional waste water treatment plants and controlled landfills were put into operation.

In the post-Vietnam era, upgrade and centralization of industrial activities were commonplace. Industrial activity centralization at building 8100 in the Custer Hill area is a prime example. Upgrade of facilities proceeded with regard to underground storage tanks, polychlorinated biphenyl-containing electrical

equipment, and asbestos-containing materials. The post acquired new areas of land for armored vehicle fire and maneuver exercises. With the advent of Federal and state laws covering a range of environmental concerns, additional attention was focused on the impact of industrial and military activities on the environment.

Current post activity does not include large-scale manufacturing operations. However, activities designed to support overall post operations include dry cleaning, paint shops, vehicle maintenance and wash facilities, bulk storage of fuel, sewage treatment plants, Defense Reutilization and Marketing Office (DRMO) salvage and waste storage, pesticide storage and application, solid waste landfills, and furniture repair. These activities and others in operation on the post require an assessment of their potential to contaminate stormwater that eventually discharges to waters of the state; they are addressed in the text following this section of the Storm Water Pollution Prevention Plan (SWPPP).

Regulated activities and stormwater drainage systems are depicted in overlays in Appendix C.

SECTION II

POLLUTION PREVENTION TEAM

The Storm Water Pollution Prevention Team implements the SWPPP. This can include such diverse activities as developing and revising the SWPPP as necessary, providing for the implementation of programmatic "best management practices" (BMPs) such as training, preventive maintenance, inspections and recordkeeping, as well as BMPs requiring construction. The team will review new construction and update the facility site map as needed where such activity is regulated by the provisions of an National Pollutant Discharge Emission System (NPDES) stormwater permit. BMPs necessary to minimize the impact of new facility industrial activity will be identified by the Pollution Prevention Team and incorporated into the design and construction of those facilities. The team will coordinate the comprehensive site-compliance evaluation and assess the effectiveness of the SWPPP and structures designed to reduce the potential for pollutants to impact stormwaters. The installation commander and his or her staff (designated representative) periodically must be briefed about the status of the installation relative to compliance with the stormwater regulations.

The composition of the team is subject to revision as necessary to achieve compliance with all aspects of the SWPPP or at the behest of the team coordinator. The recommended structure of the Pollution Prevention Team at Fort X is as follows:

- Director or Assistant Director, Directorate of Engineering and Housing (DEH)
- Garrison Commander
- DEH Maintenance Division Manager
- DEH Construction Division Manager
- DEH Environmental Office Chief/Engineer
- DEH Environmental Office subject matter expert
  [i.e., stormwater/Resource Conservation and Recovery Act (RCRA) C, D]
- Reserve Component Director

- DEH Natural Resources Branch Manager
- Representative from each O-6-level command
- Director of Logistics
- Director of Safety
- Director of Health Services, Preventive Medicine
- Director of Contracting
- Installation Training Officer
- Chief, DRMO
- Battalion Level Officer (e.g., Motor Pool Officer)
- DEH Fire Chief.

If necessary, team members can delegate personnel from their Commands/ Directorates to act as their representatives. The DEH should function as the team chair and provide the installation commander with necessary updates about team activities. On occasion, personnel from the Staff Judge Advocate Office, Public Affairs Office, or other directorates may be requested to provide guidance or other supplementary services to the team.

In addition to the responsibilities explained earlier, the team should ensure that consistency is maintained in the installation's approaches to similar issues as described in several separate but related documents, such as the Spill Prevention Control and Countermeasure (SPCC) plan, the Installation Spill Contingency (ISC) plan, and the SWPPP where these documents are consistent.

SECTION III

MATERIALS INVENTORY

No tracking system is available for hazardous material (HAZMAT) distributed from the Directorate of Logistics (DOL) warehouse to user organizations. This makes it difficult to inspect unloading operations or storage areas for other operations besides the main DOL storage/distribution areas. Certain chemicals referred to as the "dirty dozen" (see Figure III-1) receive special scrutiny regarding their distribution; that scrutiny helps determine their presence on the installation. These chemicals require DEH approval prior to distribution. Those approval records yield a partial inventory of materials and their locations on the installation. In addition, a semiannual HAZMAT inventory is required from military units, garrison activities, and tenant organizations; it is forwarded to the Fire Department, Safety, and Preventative Medicine. This inventory is required on 1 May and 1 November, in a specified format (see Figure III-2) that provides little information about where the materials are stored.

The inventory acts primarily as a "snapshot" of chemicals in use or stored at the time the inventory is submitted. In addition, these data are not responded to by all users of hazardous chemicals. In speaking with a representative from the Army Audit Agency (AAA), a new semiannual form has been implemented requiring all activities to report the location of reported chemicals and volumes on hand (see Figure III-3).

Safety officers at battalion-level units are aware of the inventory of their materials and how and where they are stored. However, material use and volume fluctuate so that observations at a given time may not be the same in a follow-up inspection, thus, altering the risk assessment as it relates to potential stormwater pollutants. Beyond DRMO activities, a detailed inventory of waste materials exposed to precipitation would be inconsistent and of no use, because of the number of individual accumulation sites, the changing levels and types of materials used, and the periodic removal of wastes by contractors for recycling. Again, the only way to

currently account for these materials is to physically observe the activities or sites during the assessment phase of the SWPPP.

Without the benefit of a HAZMAT tracking system, observations of exposed materials inventories had to be made in the field while inspecting operations subject to stormwater regulations. Appropriate site-specific comments appear in Section IV of this SWPPP.

Page No. 1
08/03/91

"DIRTY DOZEN"
HAZARDOUS MATERIAL LIST

NSN	ITEM	U.	UP	MSDS	SOS	AAC	COMMENT
6810-00-061-1104	SULFURIC ACID TECHNICAL		0.00				NOT ON AMDF
6810-00-088-8867	XYLENE TECHNICAL		0.00				NOT ON AMDF
6810-00-148-7530	SULFURIC ACID ACS	BT	10.09	R2200	S9G	D	
6810-00-149-7035	XYLENE ACS		0.00				NOT ON AMDF
6810-00-174-1919	CHROMIUM TRIOXIDE TECHNICAL		0.00				NOT ON AMDF
6810-00-181-7555	SULFURIC ACID REAGENT	BT	1.71	R2200	S9G	L	
6810-00-184-4794	TRICHLOROETHYLENE TECHNICAL	CN	32.99	R2200	S9G	D	
6810-00-184-4800	TRICHLOROETHYLENE TECHNICAL	DR	230.90	R2200	S9G	D	
6810-00-185-6983	METHYL ETHYL KETONE REAGENT		0.00				NOT ON AMDF
6810-00-223-2731	TRICHLOROETHYLENE TECHNICAL	DR	230.60	R2200	S9G	D	
6810-00-223-9073	NAPTHA AROMATIC TYPE	CN	19.68	R2200	S9G	D	
6810-00-227-0443	SULFURIC ACID FUMING ACS	LB	2.10	R2200	S9G	L	
6810-00-227-1845	SULFURIC ACID TECHNICAL	BT	6.82	R2200	S9G	D	
6810-00-233-0124	SILVER NITRATE	BT	107.59	R2200	S9G	D	
6810-00-233-0126	SILVER NITRATE	BT	35.70	R2200	S9G	D	
6810-00-235-2702	SULFURIC ACID ELETROLYTE	GL	8.86	R2200	S9G	D	
6810-00-236-5665	HYDROCHLORIC ACID	DR	14.95	R2200	S9G	D	
6810-00-238-8119	NAPTHA ALIPHATIC	GL	4.25	R2200	S9G	D	
6810-00-241-1187	CHROMIUM TRIOXIDE ACS	BT	1.00	R2200	S9G	L	
6810-00-243-4434	SILVER NITRATE		0.00				NOT ON AMDF
6810-00-249-9354	SULFURIC ACID ELETROLYTE	GL	2.45	R2200	S9G	D	
6810-00-251-8007	SULFURIC ACID TECHNICAL	LB	0.01	R2200	S9G	L	
6810-00-257-2479	XYLENE TECHNICAL	BT	1.65	R2200	S9G	D	
6810-00-257-2486	TOLUENE ACS	BT	2.46	R2200	S9G	D	
6810-00-264-3934	SULFURIC ACID TECHNICAL	BT	0.86	R2200	S9G	L	
6810-00-264-3939	CHROMIUM TRIOXIDE TECHNICAL	DR	150.89	R2200	S9G	D	
6810-00-264-5517	CHROMIUM TRIOXIDE TECHNICAL	CN	13.65	R2200	S9G	D	
6810-00-264-6723	SULFURIC ACID ELECTOLYTE		0.00				NOT ON AMDF
6810-00-264-6725	SULFURIC ACID ELETROLYTE		0.00				NOT ON AMDF
6810-00-264-8983	METHYL ETHYL KETONE TECHNICAL	BT	0.62	R2200	S9G	D	
6810-00-270-9982	TETRACHLOROETHYLENE TECHNICAL	DR	317.78	R2200	GSA	G	
6810-00-274-5200	SULFURIC ACID ANALYZED REAGENT	BT	4.75	R2200	S9G	D	
6810-00-281-2002	TOLUENE TECHNICAL	GL	4.43	R2200	S9G	D	
6810-00-281-2752	METHYL ETHYL KETONE TECHNICAL	CN	27.28	R2200	S9G	D	
6810-00-281-2763	METHYL ETHYL KETONE TECHNICAL	DR	229.92	R2200	S9G	D	
6810-00-281-2785	METHYL ETHYL KETONE TECHNICAL	GL	4.53	R2200	S9G	D	
6810-00-281-6929	METHYL ETHYL KETONE ANALYZED REAGENT	PT	3.01	R2200	S9G	D	
6810-00-281-7450	MERCURY ACS	BT	56.25	R2200	S9G	D	
6810-00-281-7452	MERCURY ACS	BT	5.40	R2200	S9G	D	
6810-00-281-7453	MERCURY ACS	BT	14.98	R2200	S9G	D	
6810-00-285-3450	MERCURY REAGENT	BT	10.41	R2200	S9G	L	
6810-00-285-4318	TRICHLOROETHYLENE ACS	GL	18.37	R2200	S9G	D	
6810-00-286-6022	SULFURIC ACID TECHNICAL		0.00				NOT ON AMDF
6810-00-290-0018	MERCURY REAGENT		0.00				NOT ON AMDF
6810-00-290-0046	TOLUENE TECHNICAL	DR	129.06	R2200	S9G	D	
6810-00-290-0048	TOLUENE TECHNICAL	CN	17.06	R2200	S9G	D	
6810-00-290-4166	XYLENE TECHNICAL	DR	175.23	R2200	S9G	D	
6810-00-294-0068	SULFURIC ACID ANALYZED REAGENT		0.00				NOT ON AMDF
6810-00-300-5554	SULFURIC ACID SOLUTION		0.00				NOT ON AMDF

FIG. III-1. "DIRTY DOZEN" HAZARDOUS MATERIAL LIST

Best Available Copy

DIRTY DOZEN
HAZARDOUS MATERIAL LIST

NSN	ITEM	UI	UP	MSCS	SOS	AAC	COMMENT
6810-00-300-6330	XYLENE CYANDLE FF		0.00				NOT ON AMDF
6810-00-368-7991	SULFURIC ACID TECHNICAL		0.00				NOT ON AMDF
6810-00-394-9395	METHYL ETHYL KETONE ANALYZED REAGEN		0.00				NOT ON AMDF
6810-00-411-4198	TOLUENE REFERENCE FUEL		0.00				CHECK AMDF
6810-00-431-7739	TOLUENE REAGNET		0.00				NOT ON AMDF
6810-00-431-7758	XYLENE ACS		0.00				NOT ON AMDF
6810-00-551-5231	SULFURIC ACID ELETROLYTE	CB	70.71	R2200	S9G	D	
6810-00-579-8431	TOLUENE TECHNICAL	QT	1.92	R2200	S9G	D	
6810-00-584-4070	XYLENE TECHNICAL	CN	18.25	R2200	S9G	D	
6810-00-584-4071	XYLENE TECHNICAL	QT	2.39	R2200	S9G	D	
6810-00-585-9885	TOLUENE REAGENT		0.00				NOT ON AMDF
6810-00-598-5620	XYLENE TECHNICAL	GL	6.80	R2200	S9G	D	
6810-00-602-1569	MERCURY ACS		0.00				NOT ON AMDF
6810-00-614-9691	SULFURIC ACID REAGENT		0.00				NOT ON AMDF
6810-00-664-0062	TOLUENE TECHNICAL		0.00				NOT ON AMDF
6810-00-678-4418	TRICHLOROETHYLENE TECHNICAL	3L	12.77	R2200	S9G	D	
6810-00-687-8429	METHYL ETHYL KETONE TECHNICAL	CN	5.77	R2200	S9G	D	
6810-00-711-2185	TOLUENE TECHNICAL	CN	0.59	R2200	S9G	D	
6810-00-732-1751	TOLUENE TECHNICAL	GL	93.08	R2200	S9G	L	
6810-00-754-2813	TRICHLOROETHYLENE TECHNICAL	PT	1.35	R2200	S9G	D	
6810-00-773-7168	SULFURIC ACID ACS		0.00				NOT ON AMDF
6810-00-796-9821	SULFURIC ACID SOLUTION	BT	4.25	R2200	S9G	D	
6810-00-812-9181	TRICHLOROETHYLENE TECHNICAL	DR	340.70	R2200	S9G	V	
6810-00-819-1128	TETRACHLOROETHYLENE TECHNICAL	CN	31.54	R2200	S9G	D	
6810-00-820-0498	XYLENE ACS		0.00				NOT ON AMDF
6810-00-823-8007	SULFURIC ACID ELETROLYTE	DR	14.89	R2200	S9G	D	
6810-00-823-8008	SULFURIC ACID ELETROLYTE	BL	10.42	R2200	S9G	D	
6810-00-823-8058	METHYL ETHYL KETONE TECHNICAL		0.00				NOT ON AMDF
6810-00-824-9071	CHROMIUM TRIOXIDE ACS		0.00				NOT ON AMDF
6810-00-837-7574	TRICHLOROETHYLENE ACS		0.00				NOT ON AMDF
6810-00-843-1640	SULFURIC ACID ELETROLYTE	DR	13.60	R2200	S9G	D	
6810-00-848-7312	SULFURIC ACID TECHNICAL	BT	11.02	R2200	S9G	D	
6810-00-893-7465	CHROMIUM TRIOXIDE TECHNICAL		0.00				NOT ON AMDF
6810-00-893-8138	SULFURIC ACID ELETROLYTE	DR	36.00	R2200	S9G	D	
6810-00-904-9372	SULFURIC ACID ELETROLYTE	DR	19.28	R2200	S9G	D	
6810-00-924-7107	TRICHLOROETHYLENE TECHNICAL	GL	10.24	R2200	S9G	D	
6810-00-927-3771	SULFURIC ACID TECHNICAL		0.00				NOT ON AMDF
6810-00-935-1839	TOLUENE REAGENT	DR	20.00	R2200	S9G	L	
6810-00-973-8581	SULFURIC ACID TECHNICAL		0.00				NOT ON AMDF
6810-00-973-8886	METHYL ETHYL KETONE REAGENT		0.00				NOT ON ANDF
6810-00-975-0707	SULFURIC ACID TECHNICAL	CB	73.34	R2200	S9G	D	
6810-00-975-1530	METHYL ETHYL KETONE TECHNICAL		0.00				NOT ON AMDF
6810-00-975-1537	SULFURIC ACID FUMING ACS		0.00				NOT ON AMDF
6810-00-985-2207	XYLENE ACS		0.00				NOT ON AMDF
6810-00-985-7098	METHYL ETHYL KETONE TECHNICAL		0.00				NOT ON AMDF
6810-00-988-8324	SULFURIC ACID ELETROLYTE		0.00				NOT ON AMDF
6810-01-013-2541	TETRACHLOROETHYLENE TECHNICAL		0.00				NOT ON AMDF
6810-01-031-1633	SULFURIC ACID ELETROLYTE		0.00				NOT ON AMDF
6810-01-031-4652	SULFURIC ACID TECHNICAL		0.00				NOT ON AMDF

FIG. III-1. "DIRTY DOZEN" HAZARDOUS MATERIAL LIST (Continued)

Best Available Copy

DIRTY DOZEN
HAZARDOUS MATERIAL LIST

NSN	ITEM	UI	UP	MSDS	SOS	AAC	COMMENT
6810-01-031-9539	SULFURIC ACID TECHNICAL		0.00				NOT ON AMDF
6810-01-031-9531	TETRACHLOROETHYLENE TECHNICAL		0.00				NOT ON AMDF
6810-01-035-1952	XYLENE REAGENT		0.00				NOT ON AMDF
6810-01-061-3409	SULFURIC ACID ACS		0.00				NOT ON AMDF
6810-01-063-4535	XYLENE ACS		0.00				NOT ON AMDF
6810-01-074-5507	METHYL ETHYL KETONE ANALYZED REAGEN		0.00				NOT ON AMDF
6810-01-086-5961	SULFURIC ACID SOLUTION		0.00				NOT ON AMDF
6810-01-091-6214	SULFURIC ACID TECHNICAL		0.00				NOT ON AMDF
6810-01-091-6251	SULFURIC ACID SOLUTION		0.00				NOT ON AMDF
6810-01-092-4366	XYLENE ACS		0.00				NOT ON AMDF
6810-01-097-2020	TETRACHLOROETHYLENE TECHNICAL		0.00				NOT ON AMDF
6810-01-099-3435	TETRACHLOROETHYLENE TECHNICAL		0.00				NOT ON AMDF
6810-01-101-1557	XYLENE REAGENT		0.00				NOT ON AMDF
6810-01-127-3142	TOLUENE TECHNICAL		0.00				NOT ON AMDF
6810-01-132-9251	TOLUENE TECHNICAL		0.00				NOT ON AMDF
6810-01-141-1460	SULFURIC ACID REAGENT	OZ	4.16	R2200	S9G	I	
6810-01-143-8108	XYLENE ACS		0.00				NOT ON AMDF
6810-01-159-7800	XYLENE ACS		0.00				NOT ON AMDF
6810-01-171-7487	XYLENE ACS		0.00				NOT ON AMDF
6810-01-181-5229	SULFURIC ACID SOLUTION		0.00				NOT ON AMDF
6810-01-208-9658	XYLENE TECHNICAL		0.00				NOT ON AMDF
6810-01-237-5351	XYLENE ANALYZED REAGENT		0.00				NOT ON AMDF
6810-01-242-7774	MERCURIC SULFATE	BT	12.93	R2200	S9G	Z	
6810-01-261-0052	SULFURIC ACID SOLUTION		0.00				NOT ON AMDF
6810-01-273-8181	SULFURIC ACID ANALYZED REAGNET		0.00				NOT ON AMDF
6840-00-242-4217	INSECTICIDE LINDANE	BT	3.01	R2200	S9G	Y	
6840-00-253-3000	INSECTICIDE LINDANE		0.00				NOT ON AMDF
6840-00-703-5238	INSECTICIDE DIAZINON	CN	48.89	R2200	S9G	D	
6840-00-782-3925	INSECTICIDE DIAZINON	GL	34.06	R2200	S9G	D	
6840-00-844-7355	INSECTICIDE DIAZINON	GL	4.00	R2200	S9G	D	
6840-00-955-0931	INSECTICIDE DIAZINON	CN	16.03	R2200	GSA	G	
6850-00-063-1405	CLEANING COMPOUND SOLVENT		0.00				NOT ON AMDF
6850-00-105-3084	CLEANING COMPOUND SOLVENT	CN	4.35	R2200	S9G	D	
6850-00-110-4498	DRY CLEANING SOLVENT	PT	1.07	R2200	S9G	D	
6850-00-148-7161	CLEANING COMPOUND SOLVENT	CN	5.13	R2200	S9G	D	
6850-00-224-6665	CLEANING COMPOUND SOLVENT	CN	18.32	R2200	S9G	D	
6850-00-264-9037	DRY CLEANING SOLVENT	DR	13.83	R2200	S9G	Y	
6850-00-264-9038	DRY CLEANING SOLVENT	CN	10.77	R2200	S9G	K	
6850-00-264-9039	DRY CLEANING SOLVENT	GL	0.16	R2200	S9G	L	
6850-00-271-9125	CLEANING COMPOUND SOLVENT		0.00				NOT ON AMDF
6850-00-274-5421	DRY CLEANING SOLVENT	CN	11.58	R2200	S9G	K	
6850-00-281-1985	DRY CLEANING SOLVENT	GL	2.76	R2200	GSA	G	
6850-00-281-3061	DRY CLEANING SOLVENT	CN	0.45	R2200	S9G	D	
6850-00-285-8011	DRY CLEANING SOLVENT	DR	83.07	R2200	S9G	K	
6850-00-285-8012	DRY CLEANING SOLVENT	DR	95.30	R2200	S9G	K	
6850-00-297-6653	DECONTAMINATING AGENT STB	DR	88.94	R2200	S9G	D	
6850-00-503-7507	CLEANING COMPOUND SOLVENT		0.00				NOT ON AMDF
6850-00-512-1097	CLEANING COMPOUND SOLVENT	CN	143.03	R2200	S9G	D	
6850-00-527-8719	CLEANING COMPOUND SOLVENT		0.00				NOT ON AMDF

FIG. III-1. "DIRTY DOZEN" HAZARDOUS MATERIAL LIST (Continued)

Best Available Copy

DIRTY DOZEN
HAZARDOUS MATERIAL LIST

NSN	ITEM	UI	QTY	MRC	SOS	ADD	COMMENT
6850-00-139-0329	CLEANING COMPOUND SOLVENT		0.00				NOT ON AMDF
6850-00-551-5198	CLEANING COMPOUND SOLVENT		0.00				NOT ON AMDF
6850-00-561-2115	CLEANING COMPOUND SOLVENT		0.00				NOT ON AMDF
6850-00-597-5765	CLEANING COMPOUND SOLVENT	GL	4.46	R2200	GSA	G	
6850-00-619-8831	CLEANING COMPOUND SOLVENT		0.00				NOT ON AMDF
6850-00-619-9864	CLEANING COMPOUND SOLVENT		0.00				NOT ON AMDF
6850-00-637-6135	DRY CLEANING SOLVENT	GL	1.00	R2200	S3G	L	
6850-00-664-5685	DRY CLEANING SOLVENT	QT	1.32	R2200	GSA	G	
6850-00-753-4627	DECONTAMINATING AGENT DS-2	CN	9.62	M22BZ	B14	D	
6850-00-753-4870	DECONTAMINATING AGENT DS-2	CN	80.41	M22BZ	B14	D	
6850-00-964-6967	CLEANING COMPOUND SOLVENT		0.00				NOT ON AMDF
6850-00-984-5853	CLEANING COMPOUND SOLVENT	CN	213.81	R2200	S3G	D	
6850-01-008-3817	CLEANING COMPOUND SOLVENT		0.00				NOT ON AMDF
6850-01-087-2960	CLEANING COMPOUND SOLVENT		0.00				NOT ON AMDF
6850-01-172-9963	CLEANING COMPOUND SOLVENT		0.00				NOT ON AMDF
6850-01-251-1542	CLEANING COMPOUND SOLVENT	BT	5.59	R2200	S3G	J	
6850-01-253-8862	CLEANING COMPOUND SOLVENT		0.00				NOT ON AMDF
8010-00-160-5788	PAINT THINNER	CN	31.94		GSA	G	
8010-00-160-5794	PAINT THINNER	GL	5.26		GSA	G	
8010-00-181-8079	PAINT THINNER	CN	40.59		GSA	G	
8010-00-181-8090	PAINT THINNER	GL	3.17		GSA	G	
8010-00-935-4737	PAINT REMOVER	GL	9.61		GSA	G	
8030-00-779-4599	ALODINE		0.00				
8030-00-811-3723	ALODINE		0.00				
*** Total ***			3607.0				

Best Available Copy

FIG. III-1. "DIRTY DOZEN" HAZARDOUS MATERIAL LIST (Continued)

Name: Haynes Rodney
Phone: 289-9894
Section: POL SPT PLT V16
Date: 25 October 1992

Health Hazard Inventory

HHC 1/16 IN
1-16 InfBn

I. CHEMICAL/BIOLOGICAL HAZARDS

Substance		Quantity on Hand	MSDS on Hand	Protective Equipment/Controls	
				Yes/No	Type Available
Oil, Engine 30wt	9150-00-188-9858	CN 23	2 ea REF (FM 10-64)	Yes	Coveralls, water, soap, drip pans, fire ext., no smoking signs, gloves
Engine 15/40	9150-00-152-4198	CN 10	" "	"	" "
Engine 10wt	9150-00-186-6668	CN 40	" "	"	" "
Engine Artic	9150-00-402-2372	CN 12	" "	"	" "
Engine Synthetic	9150-00-985-7099	QT 19	" "	"	" "
Brake Fluid Silicone	9150-01-102-9455	GL 4	" "	"	" "
Trans DEX II	9150-00-698-2382	QT 25	" "	"	" "
Antifreeze Artic	6850-00-174-1806	DR 1	" "	"	" "
Antifreeze Ethylene	6850-00-181-7940	DR 2	" "	"	" "
Cleaning Windshield	6850-00-926-2275	PT 33	" "	"	" "
Penetrate Oil	9150-00-223-4119	GL 14	" "	"	" "
OH.4	9150-00-252-6383	QT 90	" "	"	" "
OH.4	9150-00-223-4134	GL 40	" "	"	" "
FRH	9150-00-111-6256	QT 52	" "	"	" "
FRH	9150-00-111-6254	GL 17	" "	"	" "
CLP	9150-01-054-6453	PT 78	" "	"	" "
CLP	9150-01-053-6688	GL 1	" "	"	" "
Pesticide Lincane	6840-00-210-3392	OZ 274	" "	"	" "
Pesticide Durban	6840-01-210-3392	BX 8	" "	"	" "
Rodenticide	6840-00-753-4973	CN 1	" "	"	" "
			" "	"	" "
			" "	"	" "

Form 110

FIG. III-2. HAZARDOUS MATERIAL INVENTORY: SAMPLE FORM 110

BUILDING CHEMICAL INVENTORY

Date: _____ Building #_____

Point of Contact:
Name: _____
Duty Phone: _____
Emergency Phone: _____

Unit information:
Unit Designation: _____
Company: _____
Hq Phone: _____

Note: A separate inventory sheet must be filled out for each building.

NAME OF CHEMICAL and Manufacturer	NATIONAL STOCK NO.	Amt. on Hand and Type of Container GAL/DRUM, etc.	MSDS on File Y/N	Required Prot. equip. on Hand Y/N	Location IN BLDG.

FIG. III-3. BUILDING CHEMICAL INVENTORY: SAMPLE SHEET

SECTION IV

FACILITY NARRATIVES

GENERAL COMMENTS

Scope of Findings

This SWPPP addresses adherence to management practices that prevent or limit discharges of significant materials to stormwater runoff via drainage systems that lead to waters of the state or the waters of the U.S. As such, it does not address practices that violate other provisions of environmental law or regulation unless those improper practices result in a stormwater pollution risk.

Coverage of Motor Pools

In a large motor pool where tactical vehicles are found, some petroleum product residue is inevitably found. Aside from the design of the vehicles themselves, the conditions under which they operate lend themselves to spills, leaks, and "blow-by" surface contamination that eventually transfer to parking area surfaces.

Opinions are mixed concerning the need for, or advisability of, drip cans or pans for parked vehicles. While such cans prevent the occurrence of minor spills (i.e., a few drops), such spills do more cosmetic than environmental damage, although if left unattended, the cans may accumulate to cause pollution incidents, as at Fort X's motor parks (where numerous areas of oil-contaminated earth are now being excavated). Some of the units have abandoned the drip cans because they tend to get kicked or run over, thus resulting in a spill. However, the most compelling argument against the use of drip cans is that on most vehicle systems, a Class I leak (defined as more than 3 drops per hour) is a deadline deficiency; by this standard, a vehicle dripping sufficiently to need a drip can would also be deadlined and in need of repair. (Note that 30 drops a day would be a very small spot on the motor pool surface.) Unless Forces Command (FORSCOM) has changed its expectations, a deadlined vehicle should be attended to continuously until returned to serviceability – unless there is an unresolvable parts problem (not the case with leaks and seeps). Thus, the presence of the drip can may have the unintended consequence of preventing the

identification of a condition where repairs are needed. Therefore, this SWPPP discourages the use of drip cans or pans except in those situations where spills are to be expected and need to be protected against (fluid transfer and maintenance activities).

1. CONSOLIDATED MAINTENANCE FACILITY (BUILDING NUMBER 8100)

The consolidated maintenance facility (CMF) consists of several functional areas providing different services, each of which will be addressed separately. *(For installations having no CMF, each of the major activities listed here should be subjected to separate risk assessments.)*

The key factor in the CMF is that essentially no opportunity exists for any of the materials contained inside the CMF to contaminate stormwater runoff, because of the extensive use of oil sumps and the industrial waste sewer (IWS), except where those facilities themselves fail or conveyances become clogged.

A general concern is the method of transporting both industrial waste (IW) and waste oil within the CMF. They are pumped through overhead piping in each section of the building. This piping is well above the work area, thus precluding accidental damage (e.g., crushing and puncturing). However, the hazardous nature of the contents of the IW line make it a safety hazard of significance if the line should leak. stormwater pollution should not occur, since floor drains to the IW sewer should provide a sump for spillage rather than releasing the spilled material to storm drains.

At the time of our visit, however, the IW sewer inlets had become clogged, at least in the subassembly shop. Floor wash water was being swept outside to the parking area surface. Once there, it followed a depression in the parking area surface to a point outside the surrounding fence where a natural conveyance had already been created by similar drainage events through erosion.

The oil sump, to which the waste-oil piping leads, is a large underground tank that is emptied periodically by pumping its contents into a tank truck that transports the oil to the DRMO storage area. The tank is completely underground, with the outflow port itself under a manhole cover; thus, stormwater flowing over the tank area will produce no contamination. No structural BMPs appear to be in place to contain waste oil in the event of a spill during pumping; the tank truck itself may be

equipped with sensors and/or drip pans. Spill control materials are present in adequate quantities in several locations in the CMF building.

BMPs in place: Shop area supervisors must conduct periodic inspections of the drainage facilities and they should note when the drains become clogged. Spill control material is available in the event of such an event.

Stormwater Pollution Risk Assessment: Significant materials in a wide variety (any of those handled in the CMF) can run off into natural conveyances as a result of malfunction of the IW sewer and/or the oil sump. It is unlikely that the oil tank itself will cause pollution, except as the result of a spill during draining of the tank truck.

BMPs Recommended: Initiate more effective monitoring of drain intake maintenance.

A. Battery Shop

The battery shop receives lead-acid batteries from battalion maintenance shops. They are immediately placed on a temporary holding rack to await servicing and to identify leaks, which would drain onto the floor below. The floor is solid concrete and is sloped away from the floor drains (which, uniquely in the CMF, do not connect to the IW sewer but discharge to a stormwater conveyance) and toward a small channel around the edge of the floor next to the wall. Although the floor is not monolithic, it is constructed of large slabs, and the slope ensures that potential spills do not enter the cracks in the floor. The concrete is not treated but has a glazed finish. Acid spills are neutralized with baking soda, which is available in large quantities in the shop area; acid-soda residue is placed in polyethylene trash bags, which are in turn placed in conventional trash dumpsters.

Once the batteries are removed from the storage rack to be worked on, they are placed on a conveyor belt that has a sealed metal casing underneath to catch any spillage. This casing is washed down with baking soda and rinsed weekly. After attempts are made to recharge batteries, those that become functional again are returned to the storage rack area for pickup by the units; those batteries that will not hold a charge are labeled defective, and they are emptied – using a shielded inverter machine – into a sealed drum that drains (via a manually controlled valve) to a hazardous waste (HW) storage drum which is located adjacent to the inverter inside the shop.

The HW drum is properly labeled, and it is stored on a pallet for easy removal. Should a drum be punctured, containment socks and neutralizing material are available to deal with a spill. An emergency eyewash station is also available. In the drum storage area, the floor appears not to be sloped; spilled acid could discharge to the floor drain if not contained quickly enough.

BMPs in place:

- Floors slope away from drains.
- Metal catchment troughs are beneath the conveyor.
- Spill containment and treatment materials are on site.
- Most phases of operation have containment devices in place.
- Personnel know spill procedures.

Stormwater Pollution Risk Assessment: The stormwater pollution risk is insignificant. Damage to the HW drum could result in HW passing through the unidentified floor drain.

BMPs Recommended: Provide a means for verifying neutralization of material washed down the floor drain and the effectiveness of neutralization of the material that is disposed of as household waste. The point to which the floor drain discharges should be established; consider a removable cap for the floor drain.

B. Furniture and Paint Shop

The furniture and paint shop consists of a preparation room, a storage room, and a paint spray booth. The booth vents to an exhaust system (not a stormwater issue); the emissions from this operation are primarily in the form of vapors. *Booth filters are removed periodically when dry and placed in hazardous waste barrels located in the building.* The paint is sprayed either from aerosol cans or from a small hand-held, electric-powered sprayer. No floor drains are evident. It appears that the floors in the areas where paint, lacquers, and other materials are stored are not recessed to contain spills. No means are available for the spilled material to exit the area. Rags and similar items contaminated with paint or solvent from cleaning the equipment are placed in an HW barrel in the area.

BMPs in place: BMPs in place include structural restraints, as well as a spill station with absorptive socks and drysweep in the area.

Stormwater Pollution Risk Assessment: The risk to stormwater is insignificant.

BMPs Recommended: Not applicable.

C. Small Arms Repair

The small arms repair shop is a large working area primarily dealing in machining and repairs using hand tools or small desktop equipment not provided at the unit level. However, integral to this process is the use of solvent (Breakfree™ and others) for parts cleaning. Traditionally, this is done using a bath technique (i.e., letting the part simply sit in solvent) requiring 5 to 30 gallons of on-site open storage. It is possible that, as in other areas of the CMF, the solvent is provided and disposed of via the Safety-Kleen contract. Again, the shop is in the interior of the building. No floor drains were observed.

BMPs in place:

- Spill cleanup material is available
- Training will be provided in emergency response procedures.

Stormwater Pollution Risk Assessment: Risk from solvent spills associated with the storage container during operations or refilling exists. Spilled material or residue might enter drainage during disposal as refuse. This threat has a very low probability of occurrence considering the location of this shop.

BMPs Recommended: Provide training in spill response. Secondary containment for the solvent container should be provided. A spill control station should be made available.

D. Heavy Vehicle Maintenance Shop

The shop is a large maintenance area accommodating approximately 20 vehicles simultaneously. Complete maintenance capabilities at the general support level are provided here. Integral to those efforts are draining and refilling of vehicular fluids (e.g., oil, grease, antifreeze, and diesel fuel). No painting is done in this area. The facility is operated by a contractor.

BMPs in place:

- Each bay has a recessed center (approximately 12 inches deep) providing clearance for fluid collection pans and at the same time not being so deep or squared off as to be difficult to clean.
- Each bay is equipped with an oil sump tube leading to a large underground oil sump (UST) outside the facility. The tanks are monitored, and when necessary, DEH is notified to drain the tanks, which is done with the tank truck.
- The floor of the facility is crowned, resulting in a slope on either side toward large intake grilles running the length of the building; those intakes lead to the IW sewer.
- A floor sw :ep is available between each bay.
- Exterior to this area, drums are provided for the disposal of used fuel, antifreeze, etc. They are used as ad hoc satellite accumulation points. The barrels are generally in poor condition esthetically but are distinctly marked and are structurally sound; they are stored on pallets for removal on forklifts. No secondary containment exists. Barrels are filled by employees as wastes are generated; few instances of spillage were apparent, evidenced by the cleanliness of the surface below the drums.
- All personnel in the shop received orientation training about spill risk and control and all appeared knowledgeable of, and sensitive to, the need for runoff control.
- Oily waste rags are stored in properly labeled drums; then, they are bagged and shipped out as hazardous waste.

Stormwater Pollution Risk Assessment: Given current practices, the risk to stormwater is insignificant.

BMPs Recommended: Provide better control over accumulation points in terms of standardization of coloring schemes, markings for barrels, and reducing the number of ad hoc satellite accumulation points that have been established.

E. High-Volume Paint Bays

The paint bays accommodate any size vehicle owned by the Division. Paint is applied using small wheeled compressors about three cubic feet in size; the paint is contained in five-gallon cans. Since paint is used only in the basic camouflage colors, no mixing is needed; stirring sticks and waste cleaning rags are stored in HW drums. The bays contain filtered air intakes and outlets, and the walls are paneled for

removal and disposal. No floor outlets of any kind exist, and the bays are deep enough that the risk of overspray dripping out of the ends of the bays is unlikely. The bay floor slopes upward slightly from ground level so that entrance of rainwater is not a concern.

Waste paint containers are kept inside a trailer body outside the shop. They are left there to dry out. Periodically, the DEH empties the trailer into a truck that transports the waste cans to DRMO.

BMPs in place:

- HW barrel is available for miscellaneous minor wastes (e.g., rags).
- Elevated floors prevent the inflow of rain water.
- Secondary containment is available for the waste paint containers (the trailer's body has raised sides and metal floor).
- No route for paint to discharge to the outside is available (the installation had to scrape the floor in the previous fiscal year to remove accumulated overspray).

Stormwater Pollution Risk Assessment: Little risk of stormwater contamination is apparent.

BMPs Recommended:

- Train paint shop users to ensure that they understand the use and proper disposal of hazardous materials.
- When trailers are used as containers, check to ensure that manufacturers' drain holes have been welded over.
- Better coordinate the frequency of waste collection.

F. Radiator Repair Shop

The radiator repair shop has four major components: The first component is the radiator drain booth, which provides a sealed compartment draining antifreeze from radiators into the IW sewer. The second component is an acid bath where buildup is removed from inside the radiator core. This acid bath is periodically replenished by Safety-Kleen; containers of fresh material and expended acid are moved by hand truck through a doorway opening to a loading dock. Holes can be soldered over using hand-held soldering tools at a soldering station; this requires the use of lead- and

copper-based solders. Small quantities of solder flux are stored in cabinets. Finally, a freshwater rinse is used for leak detection and for cleaning radiators.

BMPs in place:

- All process tanks drain directly into the IW sewer.
- All process tanks are located within secondary containments (i.e., a concrete berm and floor system) that have drains leading to the IW sewer.
- The shop floor is recessed well below the level of the main building floor (approximately five inches) and has a single drain that leads to the IW sewer.
- Shop personnel have been trained in the proper handling of waste solder flux, which is collected and recycled.

Stormwater Pollution Risk Assessment: As long as the IW sewer is operational, the risk of stormwater pollution is insignificant.

BMPs Recommended: Develop procedures for inspection of the IW drainage port.

G. Metalwork Shops

A large work area with several dozen assorted metalworking machines (e.g., lathes and polishers) is available. In some cases, these machines incorporate cooling fluid systems which, like the machines themselves, are electrically powered. Fluids flow from storage tanks under benches at each workstation. Small quantities of lubricants and solvents are stored in cans at the workstations. Metal shavings drop onto the floor where they are swept up and disposed of as solid waste by a scrap metal salvage contractor.

BMPs in place: All floor drains lead to the IW sewer. No other means of discharge for spilled materials is available.

Stormwater Pollution Risk Assessment: No risk to stormwater from current operations exists.

BMPs Recommended: Not applicable.

H. Subassembly Shop

The subassembly shop is a large work area where subassemblies of major end items are repaired. This is the essential fourth shop-level work: working on pieces of the end item that units are not allowed to repair. The work is largely bench work. Working quantities of solvents and other regulated materials are found here; waste rags contaminated with those materials are generated from the assemblies. This is one of the few work areas within the CMF (other than the heavy maintenance bays) where there are any doors or other means of egress.

BMPs in place:

- Preliminary washing is accomplished through a hot water cyclone machine that drains into the IW sewer.
- Accumulation barrels are provided near the work benches for the disposal of HW, which primarily consists of used containers, contaminated waste rags, and used floorsweep.
- Oil sumps in the floor lead to a large waste oil tank outside (this tank was discussed earlier).
- Numerous floor drains are connected to the IW sewer. However, the floor does not effectively slope toward these drains and their intakes are quite easily clogged.

Stormwater Pollution Risk Assessment: Contaminated water washing out of the building after washdown as a result of clogging of IWS intakes is a risk to stormwater.

BMPs Recommended: Undertake more effective monitoring of the IW sewer line to identify clogged intakes.

I. External Storage Yards

The CMF has three external storage yards common to most Division-level maintenance facilities. Each is discussed below.

The parking lot for vehicles awaiting service or pick-up is made of rough concrete with storm drains; all surfaces in this lot either slope toward a storm drain or outward toward the fence line. The storage yard is located on a rise. Stormwater can run off directly from the fence line to a relatively steep slope that leads down to a drainage ditch along the road to the north of the CMF. That ditch runs for

approximately one-quarter of a mile before discharging to a small tributary of Wolf Canyon Creek.

The cannibalization point is essentially a vehicle junkyard: vehicles deemed not economically repairable are left there so that unit maintenance activities can obtain spare parts from them until the vehicles have value only as scrap. The installation has a policy that no vehicle may enter this yard until all fluids have been removed. That policy clearly has not been followed. The yard is lightly graveled and shows several spots of contamination.

The storage yard contains a large quantity of miscellaneous items, mostly stored in weather-resistant containers or under covers (e.g., barrels, crates, plastic-wrapped) received in bulk from the issuing depots. This particular storage yard is sharply sloped away from the CMF toward a drainage ditch and an occupied trailer complex. Among the many items in the yard, close to the entry gateway are several stacks of drums of sulfuric acid and diesel fuel (raw materials, not waste). While those storage piles were orderly, they bore no special hazardous markings and were very close to a gateway through which forklifts and trucks pass frequently.

BMPs in place: Spill cleanup material is available for emergency response.

Stormwater Pollution Risk Assessment: From all of these areas, spills, leaks, or runoff of regulated materials can occur. Three or four channels around the fence line have been created by stormwater runoff; they were observed transporting oil-contaminated water; these channels lead in all primary directions from the CMF down a relatively pronounced slope into intermittent and perennial streams that drain from the CMF area and eventually discharge to Wolf Canyon Creek. In addition, the soil and road ditches all around the CMF are clearly contaminated with oil and other petroleum-based materials.

BMPs Recommended:

- Provide more effective training for facility personnel and customers. Review and correct existing policies to bring them into conformance with egulation and to provide command emphasis to ensure they are carried out in the future.
- Provide a narrow open gate at the cannibalization area for personnel to enter and acquire parts. Provide a wider locked gate to control the entry of a

vehicle until inspected. This would be an inexpensive solution to the excessive discharge of fluids.

- Provide a lined or concrete drainage system around the CMF fence to canalize and collect runoff toward an oil-water separator system. Provide an oil-water separator and procedures for maintenance.
- Clearly mark areas where regulated materials are stored. Label containers as required by regulations. Move those areas out of the line of heavy traffic flow. Provide covered storage and curbing or other secondary containment for hazardous material storage areas.

J. Miscellaneous

The upholstery, canvas repair, and electronics repair shops and the Class IV parts storage area contain regulated materials in small bench-top working quantities that could not spill in sufficient quantities to reach any existing floor or storm drain system.

BMPs in place: Not applicable.

Stormwater Pollution Risk Assessment: No reasonable risk of stormwater pollution emanates from any of these sources.

BMPs Recommended: Not applicable.

2. GAS CHAMBER

The gas chamber is located in an old World War II-style building. It is recorded as being too leaky for effective performance because the gas dissipates too quickly. Therefore, it follows that precipitation may enter and leave the building by the same routes as the air. As with most structures on Custer Hill, the building is located on a slope above intermittent streams and tributaries to perennial surface waters.

The gas used in the chamber is produced by combustion of powdered tear gas (CS), which is not stored in the building but rather in the units' storage areas in the cantonment area of Custer Hill. The gas is largely dissipated in a short time due to leakage through building crevices and through open doorways where troops enter and leave the chamber.

BMPs in place: Not applicable.

Stormwater Pollution Risk Assessment: Stormwater runoff containing traces of CS could eventually arrive downstream in the water bodies. The CS would not evaporate until exposed to open air on open ground at temperatures about the 55° F range; thus, percolation is not necessarily an attenuation factor. However, the very small amounts of CS that would leave the gas chamber and eventually discharge into state waters do not justify any great expense to resolve. In general, the practices at the gas chamber may pose an air emissions issue but have little potential to contaminate stormwater runoff.

BMPs Recommended: A catchment area under the building, with a connection into the sanitary sewer, would be relatively inexpensive to install and would at least divert dissolved CS away from the natural storm drainage areas and into the sanitary treatment plant (STP).

3. OPEN BURNING/OPEN DEMOLITION SITE (RANGE 16)

The OB/OD site is located at the edge of the impact area at Range 16. The number of OD pits varies because new holes are created for each "blow" and filled in afterwards. The holes are 12 to 15 feet deep and generally 18 to 20 feet long. Explosives are placed in the bottoms of the holes, covered, and tamped. The explosives are detonated and the resulting crater is filled in again, generally within a few days. At Fort X, the OB/OD permit limits each "blow" to 100 pounds net explosive weight; thus, the effect of the detonation is minimal, especially in comparison to the full-scale tank firing ranges nearby.

One OB site is available. It is used infrequently because of its age and limited control measures. It consists of an earthen berm approximately 8 feet high. The site is on a small rise that clearly drains to a creek, located some 150 meters away, with the flow primarily passing along the center of a natural draw that leads down to the creek area.

Materials to be burned (generally small arms, which are ineffectively destroyed through detonation) are combined with high-Btu flammables and the whole pile is ignited. The flammables are brought in from the Explosive Ordnance Detachment (EOD) storage area by pickup truck for the event. EOD representatives stated (with some uncertainty) that after the fire extinguishes itself, the resulting material is

removed and disposed of, and the pit is excavated and covered. We could not resolve the eventual fate of the material. Large volumes of small arms ammunition should generate a significant slag with high concentrations of lead (from small arms rounds) and the components of the brass from which the cartridges are formed. If not properly controlled or promptly covered, residue from this burning could enter the natural drainage through stormwater runoff.

A large hole (probably a former OD pit) serves as a dump for nonexplosive components of ammunition that are brought to the site. This material is almost entirely composed of metal waste, largely steel and aluminum, along with some composite laminates containing metals and fiberglass resins. Examples include rocket motor housings, empty bomb casings, artillery shell canisters, and mortar tailfin sections.

BMPs in place: No BMPs of a structural nature are in place. Post-engineering support to remove OB residue is coordinated on a case-by-case basis. The natural vegetation between the OB site and the creek would attenuate some components (e.g., suspended solids) of surface flow.

Stormwater Pollution Risk Assessment: Because the OD craters, to include the dump crater, have no surface drainage impact, they pose no stormwater contamination risk. Some of the soil and dust ejected from the blow may be contaminated with metal from the casings or organic material from the explosives, but this is diffused over a wide area and does not constitute a point source discharge. The OB pit does have a means of drainage to state waters, thereby causing contamination, especially where residue is not promptly disposed of or covered and compacted. The potential for soil erosion from the cover material makes proper covering and clean cover material important.

BMPs Recommended: Local standard operating procedures must be strengthened to ensure that earthmoving equipment is on hand at the time of the burn and that residue removal and covering operations are conducted in accordance with regulations. That will ensure that waste from the OB pit is removed as soon as possible after the burning operation is completed and that the site is covered to protect it from pollution through runoff. To reduce erosion, hay bales could be placed on top of the cover.

4. SEWAGE TREATMENT PLANT (CUSTER HILL)

The Custer Hill STP is one of three operating STPs on Fort X. Although it is not the largest, it poses the greatest overall pollution potential because almost all of the industrial facilities on the post are located on Custer Hill and some of their wastes discharge to the STP.

The sewage treatment plant is rated at 2 million gallons per day (mgd) throughput and generally processes up to 1.2 mgd. The plant contains a mechanical pretreatment shredder. Primary treatment clarifiers and secondary treatment trickling filters are components of this treatment system. In addition, treated effluent is processed through a filter drum to remove snails that inhabit the trickling filters. The effluent is discharged directly to a tributary of Wolf Canyon Creek. A nearby trout-stocked pond is not a recipient of this effluent. The effluent is sampled for compliance with permit levels and meets those requirements.

Sludge from the various treatment devices is fed into a large digester tank where the typical holding time is approximately 90 days, and from there it passes to drying beds located in two tiers on the hillside above the digester tank. These beds can hold up to 6 months of sludge output at current rates; only 4 of 12 beds were in use at the time of our visit. The 2 beds that were considered full had over 6 inches of freeboard.

No chemicals are used at any point in the treatment process. The only regulated materials on site are used in the maintenance of the pumps and other mechanical equipment; these materials are contained in concrete-floored buildings and are adequately protected through secondary catchment containers and spill protection stations. They are kept off the floor by racks or pallets. If precipitation entered under the doors of the buildings, it would not come in contact with the storage containers. However, some of those buildings, particularly those containing the main pumps, do have floor drains in sumps beneath the pump machinery; the discharge points of those drains are unknown. The pumps are electric powered. We observed no backup generator on site; however, subsequent research reveals that there is such a generator, fed by diesel fuel from an underground storage tank. There is no exposure of any of the materials in these buildings to precipitation.

The site falls away sharply from west to east, with the sludge drying beds at the top of the hill. The process begins with the shredder, etc., located immediately below

the sludge beds and next to the sludge digester tank. Primary and secondary treatment areas follow with the outfall at the creek on the east side of the plant area at its lowest point.

Several potential stormwater pollution issues arise at this STP. They are discussed below.

The waste water moves in a downhill direction through the plant, which is in a rather small space on a hillside above Wolf Canyon Creek. Although the plant is rated at a greater treatment capacity, the intake chutes at current flow appear quite full. If the mechanical filters were obstructed, or if the intake was overloaded by extensive precipitation flow from the slope above, any overflow would run off a steep slope directly into the creek or pond below. This is, however, quite unlikely.

The plant frequently receives influent that is not specified in the plant permit or that may interfere with the proper functioning of the plant. These are frequently waste oils that have been deposited in sewers. Detection of these wastes is done visually (a sheen is observed). Where this occurs, plant operators isolate the waste stream into a specific clarifier (often one not in use because of reduced flow) and pump it out as hazardous waste. However, there must be numerous instances of undetected unauthorized wastes being discharged without treatment or removal. While it may cause pollution of the receiving waters, it is an NPDES issue rather than a stormwater issue.

The plant cannot treat all of the pollutants that it receives in the influent. Unauthorized disposal of oils from the many motor parks on Custer Hill (as noted above) is but one example. At the time of our visit, the effluent appeared to have contained detergent or other surfactants, as evidenced by foaming of the effluent. The fact that these streams were unauthorized or were not envisioned by the system designers does not obviate them as a pollution threat. In addition, untreated wastes that settle out of the water stream may impact the efficiency of the digester or may have no digester impact and may be contained in the sludge drying beds as hazardous components. The sludge is not sampled. Again, these are NPDES issues rather than stormwater issues.

BMPs in place: Operators are certified. Visual inspection of the entering waste stream is performed by the plant operators on a continuing basis as they perform their daily duties. Standard operating procedures (SOPs) and practices call for the

isolation of waste streams where there is apparent contamination. Chemicals are not used in the treatment process. Sludge drying beds have adequate freeboard to protect against flooding.

Stormwater Pollution Risk Assessment: There is limited risk of stormwater contamination, other than as a result of a major storm creating flooding.

BMPs Recommended:

- Provide stronger SOPs and mechanical processes in the barracks and motor pool areas to preclude industrial wastes from entering the sanitary sewer.
- Review floor drainage systems schematics and reroute them, if necessary, to a holding tank or the STP afterflow through an oil-water separator.
- Provide a soil and grass berm or equivalent to capture potential overflow from the pretreatment channel and redirect it to the primary clarifiers. Again, it should be noted that such overflow is unlikely to occur except from a severe storm.
- Engage in real-time monitoring of influent to detect unauthorized substances.
- Complete process modifications to address recurring pollutants (e.g., oils and detergents).
- In view of the questionable handling of "industrial waste," complete process modifications to handle industrial wastes generated on Custer Hill.

5. ARMORED VEHICLE BATTALION MOTOR POOL

This generic description covers all three types of unit motor pools we examined: a tank battalion, a self-propelled artillery battalion, and a direct support maintenance battalion (note that the direct support maintenance activity itself is addressed below).

The motor pools are concrete surfaced. They have been contoured so that water flow moves to several storm drains located 80 to 100 feet from the fence lines. Some motor pools have the area from the fence to the drains sloped in toward the drains, while others have it sloped toward the fence line. The objective, in any case, is to remove standing water as quickly as possible. In this, the system is very effective. However, the effluent is clearly contaminated with oil and other petroleum products washed away from the surface of the motor pools. Generally, the drains do not lead to any treatment or storage system; all of the motor pools sit on elevated fingers of land

above natural drainage paths. The storm drains run to the nearest intermittent streambed, gully, or other naturally occurring stormwater conveyance. In a number of cases these conveyances have been enhanced with concrete sections to improve the water flow across areas with limited slope.

Some motor parks contain gasoline fueling stations. Those observed appeared to be well maintained with no evidence of contamination from fueling operations; subsurface contamination via infiltration is not a stormwater issue. This cleanliness (good housekeeping) resulted from continuing emphasis on drip containment and from the fact that in each battalion, the petroleum, oil and lubricants (POL) section had been designated as the unit's Hazardous Material/HW team and had been trained as hazardous material handlers.

All motor parks contain fuel trucks, mostly transporting diesel fuel. Those trucks tend to leak, especially around the points where pumps and hoses connect; over time, significant quantities of seepage can build up on the ground. For fire safety reasons, fuel tankers are parked on the outer edges of the motor pools, which makes it more likely that leakage is directed toward the surface water drainage pattern rather than being cleaned up; this was the case in two of the three units we observed.

All motor pools contain maintenance bays. Those bays contain extensive spill control materials. The natural tendency toward cleanliness of work areas (particularly in the line units, less so in the support units) ensured that spills were addressed promptly and the residue was removed daily. The disposal of the absorptive material varied; some disposing of it as HW, some bagging it and disposing of it as nonhazardous solid waste, and some disposing of it as nonhazardous solid waste without bagging. Oily rags were likewise treated either as hazardous wastes or were sent to the post laundry for cleaning. Most facilities had one bay with a concrete pit for performing inspections and undercarriage work; that pit contained an oil-water separator discharging through overhead piping to a waste oil drum on the wall of the maintenance area. In all areas we visited, those separators were not used, and the pit was not allowed to be used either; no explanation was offered why this was the case. The drains in these pits flow to the STP.

Most motor pools contain several washrack bays intended for washing down soils from field exercises. Those bays are walled depressions in the motor pool surface

equipped with high-pressure hoses; they are generally situated along the motor pool fence line. The bays contain physical screens and baffles intended to prevent large solids or mud piles from entering and clogging the drains, which lead a short distance to natural drainage conveyances. The routing of the storm drains and wash drains to specific outfalls is erratic, apparently with an elaborate crossing of lines under the motor pool surface; in some cases, we found outfalls near intakes that did not handle the water from that intake. The actual outfall was completely on the other side of the motor pool. A significant quantity of oil and fuel is part of the normal runoff of washing down a tracked vehicle. Recently, this has been stressed through intensive training exercises; in addition, troops apply detergents to eliminate the finer dirt cover. The installation built a large central washrack with environmental controls at the main exit from the training area; however, vehicles are also used in small exercises and even in local driving near the motor pool area. Either because the delay at the central washrack is too great, or because the vehicle never goes far from the motor pool, units will continue to use their washracks. Solutions that ignore this reality are certain to fail.

All motor pools contain larger washrack and maintenance bays outdoors under a carport cover. The bay area is elevated by concrete ramping some 8 to 12 inches above the surrounding motor pool surface. Between the cover and the elevation of the pit surfaces, contact with stormwater runoff, except during a storm with high winds, would be unlikely. The facilities contain one hot water washrack, which drained directly to the storm sewer (without oil-water separators) and that also provides overspray drainage across the motor pool to the storm drain intakes. The facilities also contain a maintenance bay with oil drainage sumps on sliding rails above the level of the base of the pit; those sumps lead to an underground storage tank for waste oil. These sumps were seen as ineffective because they were still some 25 to 30 inches below the drain holes on the vehicle and provide a flat-bottomed box for the oil to drain into; this leads to significant spillage and splashback. Additionally, no facilities are available for draining other fluids (e.g., antifreeze and hydraulic fluids). The underground sump tank has no automated fill controls; procedures call for weekly stick-checking and for DEH to be called when the tank is half full.

All motor pools contain a satellite hazardous waste accumulation point. The post has adopted a standard model that has space for as many as five waste drums. The structure is roofed and enclosed on three sides, and it contains a metal tray for

secondary containment and wooden palleting to expedite storage and loading/unloading. The open front is enclosed with heavy-gauge wire mesh to prevent unsupervised access; units had different procedures for keeping the accumulation point accessible or secure during duty hours. The practices for controlling the closure bungs also varied. In some units, the bung key was left available to prevent troops from leaving unlabeled cans at the HW point rather than trying to find the HW staff. In other units, the bung key was controlled to prevent deposition of wastes into the wrong barrel. Spills in these areas were primarily waste oil, perhaps because that is by far the most intensively handled material. Some units were much more meticulous and prompt in their cleanup than others.

No battery-related operations are performed in unit-level motor pools; cracks and leaks are dealt with as spills [i.e., neutralized with soda ash (on hand) and swept up with floorsweep for ultimate disposal]. That disposal practice also varies, waste being double-bagged and treated as HW in a few cases but being placed into nonhazardous refuse containers in most cases.

All motor pools have a POL storage area where all commodities other than fuel are stored outside except for small cans of oil or grease. Drums of motor oils, etc., are stored horizontally on racks. Opened barrels (in service) are stored either in this manner or vertically on pallets depending upon the condition of the drum. Spill clean-up material was present and no spillage was evident.

By definition, motor pools are intended for parking large numbers of vehicles. The Army's tactical vehicles are designed for rugged effectiveness rather than pristine esthetics; inherent in their design is a certain amount of dirt and grime. Units varied in their use of drip cans to deal with leaks, etc. The cleanest motor pools appeared to belong to those units that did not endorse drip cans, apparently because those units required more frequent cleanup of seepage and/or because those units did not tolerate leakage (which in general is a deadlining deficiency).

Although we did not see it happening because of the weather, extensive painting, mostly brushed touchup is being done in the unit area. But, the sheer volume of paint utilized is large primarily because of the size and number of vehicles. Paint, in 1gallon or 5-gallon cans, is stored in cabinets designed for this purpose located in the motor pool area. The CARC paint used is a regulated substance; some

of it gets into the storm drainage system. *The post's SOP calls for waste paint and paint containers to be disposed of as HW.*

BMPs in place:

- Education programs and SOPs emphasizing clean operations
- Extensive spill control material
- Extensive monitoring by the trained POL team
- Inventory controls and recordkeeping by the POL team
- Physical controls (especially oil-water separators) in formal maintenance work areas
- Secondary containment and roofing on HW accumulation points
- Centralized washrack facility to limit the need for unit washracks.

Fill protection on the oil sump depends upon adherence to the inspection procedures. Unit POL section members seemed knowledgeable about this requirement.

Stormwater Pollution Risk Assessment: All motor pools handled essentially the same materials: virgin and waste oil, fuel, antifreeze, and hydraulic fluids. In general, provisions have been made for the control of incidental spills of these materials during maintenance operations through physical facilities and through training. The greatest amount of pollution and pollution risk occurs in runoff from the motor pool surface as a result of leaks, spills, washing, and the subsequent commingling of these fluids with stormwater runoff to drainage conveyances.

BMPs Recommended:

- Provide oil-water separators for unit washracks. Additional oil-water separators must be installed in motor pool storm drain systems.
- Provide inspection and maintenance programs for, and training on the use of, existing oil-water separators as needed.

- Provide better collection devices for the oil sump for the covered maintenance bays. Troops have suggested using a telescoping funnel allowing the oil to be caught soon after leaving the oil drain plug, thus eliminating splashback. That would be an inexpensive, locally fabricated device.
- Clarify SOPs concerning the proper disposal of oily rags and used dry sweep.

6. DIRECT SUPPORT MAINTENANCE ACTIVITY

Direct support maintenance occurs in a single large building (the "Star" building) housing all such activities. Direct support (DS) maintenance units do not keep their own equipment here; it is maintained at unit-level motor pools.

Both externally and internally, the building is much like any of the other motor pools: concrete floor surface, wash facilities (both the covered formal racks and the underground bays), and hazardous waste accumulation points. Internally, the units have covered maintenance bays; again, one has a pit with an oil-water separator that is not always used. Because the DS units can remove engines and components, there is a higher risk of fluid spills; but, in all cases, we saw extensive use of large drip barrels to prevent excessive spills. Dry sweeps are available extensively. Solvents are used; the solvent baths are maintained through the Safety-Kleen contract. The DS shops do not perform battery maintenance or painting. No indoor floor drains were evident. In general, the issues are much the same as those found at the unit level. However, less washrack activity exists because the DS unit does not have to accept a vehicle for repair that is not clean on arrival.

BMPs in place: See unit MP description in Subsection 5.

Stormwater Pollution Risk Assessment: See unit MP description in Subsection 5.

BMPs Recommended: See unit MP description in Subsection 5.

7. AMMUNITION SUPPLY POINT

The ammunition supply point is located on a hill above the Main Post and hospital area. The major structures are storage igloos. A warehouse is used for storing the ASP's six diesel-powered forklifts. In one igloo, ammunition is

maintained and essentially restricted to repackaging, which includes some painting (of stencil crates).

Stormwater pollution is unlikely. The potential for runoff passing through any of the structures is remote. An uncontrolled spill from the forklift maintenance area, particularly with regard to refueling activities, could result in releases to the natural drainage area.

BMPs in place: The work area for forklift maintenance contains spill control material. Regulated materials are generally stored properly. No floor drains are in the maintenance area.

Stormwater Pollution Risk Assessment: Given current operations at this site, no risk to stormwater exists.

BMPs Recommended: Not applicable.

8. REMOTE TRAINING SITE (MPRC)

The multi-purpose range complex (MPRC) consists of a series of live firing ranges, where combat units drill for periods of 10 to 30 days and a cantonment area, where training units stay while training. Units contain as many as 800 persons. A small building complex is used by the 10 to 15 full-time range management personnel. One large control tower overlooks the ranges.

The most significant at-risk facility is the transient unit motor pool, a non-surfaced parking lot with a single covered building containing maintenance bays similar to those found on the Main Post. Recent awareness campaigns in the units have eliminated a formerly significant problem with spills in the parking area. Neither the parking area nor the building have storm drainage systems. Although the entire MPRC is on top of a hill, the motor park is in a slight depression below the rest of the cantonment area; thus, off-site surface drainage is minimal. Prior to departing the facility to return home, the unit must undergo an inspection by the MPRC staff, part of which is to ensure the cleanliness of the motor pool area. Visits also occur daily. The motor park has a contained HW satellite accumulation point similar to those found on the Main Post.

Assorted oils and greases are dispensed from the cantonment area mess hall, barracks, and latrines. While not regulated under the stormwater regulations, these

wastes commingle with wastes from the MPRC in a permanent staff building (which does have floor drains) in a waste treatment facility consisting of three oxidation ponds. Of these units, the largest is not used presently; so, adequate surge capability exists.

The MPRC staff building contains maintenance shops for the light vehicles operated by MPRC staff as well as for that range is mechanical and electrical equipment. Also, it contains a battery shop that recharges, but does not disassemble, batteries. While there is a potential for leaks and spills from these work areas, the volumes of potential spillage material are low. Extensive spill control material is present, and the area is maintained in an exceptional manner.

In addition, the MPRC staff has its own maintenance yard where its heavier vehicles (e.g., tractors and graders) are stored. The area is graveled. Aside from the vehicles that are potential sources of leaks and seeps, the yard has a hazardous waste storage point (i.e., a conex container) and fueling points. This HW storage unit contains both virgin and waste oil. At the time of the visit, it was in a poor state of repair and internally in disarray. It posed a high threat of spills as a result of insufficient space for proper vehicle maneuvering; the conex container has no means to contain spills, although there is a barrel of dry sweep for clean-up. The fuel point consists of a mogas tanker truck, which had no evidence of a grounding system, drip cans, or other spill or leak protection; and an aboveground storage tank (approximately 200 gallons) for diesel fuel. This tank is in good condition, has a lined tray filled with sand beneath it, and has drip barrels for the refueling nozzles.

The central control tower has no industrial activity and no potential to affect stormwater pollution.

Pollution potential: Uncorrected spills or leaks in the motor park areas, both the MPRC staff areas and the transient unit area may cause pollution. Overflow from the oxidation ponds can also cause pollution, but that is unlikely.

BMPs in place:

- Daily inspections of the transient unit motor park
- Checkout inspection
- Secondary containment on the transient HW point

- Containment and spill control at the MPRC diesel point
- Awareness, cleanliness, and spill materials in the MPRC building.

Stormwater Pollution Risk Assessment: The risk is minimal. The transient unit area and the MPRC staff building have good housekeeping and containment BMPs in place. The risk of pollution is greater as a result of spills in the MPRC staff maintenance lot, especially from the HW conex. A new accumulation point structure is scheduled for installation later in the year; that should alleviate many of the issues arising from inappropriate and inadequate space.

BMPs Recommended:

- Install new HW accumulation point
- Provide secondary containment at the MPRC staff HW point
- Provide drip and spill control at the MPRC mogas tanker
- Implement a housekeeping plan and procedures for the MPRC yard.

9. SUPPLY AND SERVICES, CAMP WHITSIDE – BUILDING NUMBERS 651 THROUGH 669

These DOL facilities are general-purpose warehouses used to receive and provide storage of materials shipped by rail and highway. Materials are also shipped from these facilities to support installation activities. The warehouses are constructed primarily of concrete floors, wood walls, and steel roofs (with sprinkler systems in place). Stored materials consist of petroleum-based oils and fuels, solvents, corrosives, and other reagents, many of which are hazardous materials referred to as the "dirty dozen." The distribution of these materials to troop units and garrison or tenant activities requires DEH approval. The goal is to promote the use of less hazardous substances such as Safety-Kleen, where such a substitution is acceptable.

The DOL is the prime conduit for distribution of supplies to the installation. DOL provides logistics support to the POL maintenance support unit; the bulk POL tank farm; engineer battalion; and DEH activities requiring herbicides, fertilizers, and so forth. Therefore, frequent loading/unloading occurs; vehicular traffic is significant. Drums, carboys, and cartons containing bottles and cans of materials are stored. Hazardous materials are stored primarily inside. Those materials are stored

in a manner that allows for proper aisle space for material handling equipment. Good housekeeping practices are evident throughout the storage areas.

Spill equipment is on site and consists of absorbent pads, "socks," and vermiculite. Warehouse employees are trained in the use of this equipment and in ISC practices. When required, drivers have commercial drivers licenses (CDLs), including those who may be required to transport hazardous materials (defined as those substances requiring an MSDS). Loading docks are protected from precipitation by the roof that projects beyond the sides of the building. A hazardous material tracking system for tracking hazardous material moving from DOL warehouses is not in use at Fort X. A semiannual inventory provides data about the volume and types of hazardous materials on hand for army units, garrison activities, and tenants. This inventory, however, only provides a "snapshot" of the volume, types, and locations of hazardous material at the time of the inventory and does not provide a mechanism to assess risk using storage location, volume, and toxicity as parameters. Safety officers at the battalion level may be able to provide information related to inventory storage.

Material safety data sheets are requested with purchase orders or can be obtained through the Depot System Command from a CD-ROM-based system.

BMPs in place: Not applicable.

Stormwater pollution risk assessment: Spills that occur during loading/unloading operations present little risk of surface transport via stormwater runoff to state waters. This is due primarily to the topography of the area, the travel distance to surface waters, and the absence of drainage conveyances with discharge to state waters. In addition, the railway bed located to the east of the facility would act as a barrier to surface flow to lowland water bodies.

BMPs recommended: Not applicable.

10. OIL STORAGE FACILITY, CUSTER HILL TROOP AREA – BUILDING NUMBERS 8311 THROUGH 8314

This facility is comprised of aboveground storage tanks (ASTs) for POLs, drum storage of POLs, a service area for bulk loading of fuel transport vehicles

(i.e., hemmets), a slop oil storage tank, a pump room, a drum loading building, and a general purpose operations building.

The ASTs contain mogas (two tanks), diesel fuel (two tanks), kerosene, and slop oil. A lift station adjacent to the pump room discharges oil and water received from sumps and associated piping located in the service area, as well as from a grated sump in the containment area for one of the diesel fuel tanks. An oil-water separator located adjacent to the slop oil tank discharges water into the water retention basin located east of the facility. With the exception of one 10,000-gallon kerosene tank constructed of earthen berms with a gravel cover, all of the ASTs are provided with secondary containment. The kerosene tank has a concrete pad and 3-foot high walls for secondary containment. This containment area is drained via a grated sump and piping controlled with an OS&Y valve to allow for drainage into the lift station. All of the tanks are of steel construction. The tanks and associated piping are rusting in seams, valves, flanges, etc.

Piping in the pump house is leaking. Some of the drip pans provided to contain those leaks are overfilled.

Spills in the service area are directed to sumps leading to the slop oil lift station. Some of the synthetic rubber hoses used for fuel loading are not properly stored or maintained, which results in structural damage. Hoses are not stored in troughs or similar structures to allow for collection of residual fuel and to avoid damage from vehicular traffic.

The southeast corner of the site shows evidence of soil contamination and drains into an intermittent stream. Waste oil containers are on a paved area of the southeast corner; they leak onto the surface. These containers have 55-gallon and 5-gallon capacities. Some are unlabeled as to contents and not provided with bungs or caps. Runoff from this area is into a drainage ditch that contains standing water with an oil sheen. A culvert down the gradient from these containers also contains oil-tainted water at its discharge point. This culvert also discharges into drainage ditches that pour into branches of an intermittent stream.

Additional drums of waste oils are located on the asphalt adjacent to the southeast end of the loading dock for building 8312. These drums are either not labeled as to contents, not provided with bungs, or are damaged. Evidence of oil stains appears on the hardtop. Runoff from this area flows in a westerly direction,

eventually discharging into a culvert and drainway southwest of the facility. A culvert in this drainage area was discharging oil-tainted waters at the time of the site visit. The stormwater drainage network in this area leads to intermittent streams that are in the watershed for the Kansas River.

Drainage along the northern periphery of the facility is through a riprap-lined ditch discharging to culverts that direct runoff to concrete drainways in a southwesterly direction — ultimately to grated stormwater drains that discharge into the culvert located outside the fence line southwest of the site. Although there was little evidence of contaminated runoff along this drainage system, considerable soil erosion has occurred in the vicinity of a concrete pipe culvert headwall located east of the fuel service area. That erosion allows for the discharge of silt-laden runoff and undermines the concrete drainway. Soil bank stabilization is necessary in this area.

Stormwater drains along the south side of the facility between building 8312 and the fuel storage areas provide drainage for this area. However, unless oil-water separators are in place, these could serve as a conduit for oil tainted runoff given the presence of oil stains on the pavement in the vicinity of these drains.

BMPs in place: Not applicable.

Stormwater Pollution Risk Assessment: There is a risk of pollution of stormwater runoff from this facility that would ultimately discharge to state waters. The pollutants would primarily consist of petroleum products in the forms of raw materials and waste. Given the present operation of the site, petroleum-contaminated runoff would flow through culverts and other stormwater conveyances on-site into intermittent streams located south and east of the facility; ultimately, those conveyances discharge into the Kansas River.

BMPs Recommended:

- Inspect oil-water separators. Install separators along the SW drainage system servicing building 8316.
- Provide for the accumulation of waste oil containers, such as portable storage sheds, to avoid exposure to precipitation.
- Stabilize soil along drainage areas.

- Inspect bulk tanks and related piping for leaks or evidence of corrosion. Take prompt corrective action.
- Schedule nondestructive testing of bulk tanks and ancillary piping using criteria established by NFPA, API, EPA, state, and/or other agencies developing AST testing protocols.
- Train facility personnel and drivers about spill response measures, including access to spill containment devices necessary for initial response.

11. SANITARY TREATMENT PLANT, MAIN POST - BUILDING NUMBERS 390 THROUGH 393

The Main Post Waste Water Treatment Plant is a secondary treatment system consisting of a Parshall flume, bar screen, and comminutors at the influent side discharging through a wet well to a primary clarifier, two trickling filters, and a secondary clarifier with discharge into the Kansas River. The effluent from this plant is discharged according to the requirements of an NPDES permit. Sludge from primary clarifier is discharged into an anaerobic digester and ultimately to ge drying beds east of the treatment plant. Effluent is not chlorinated.

The plant is operating at 25 percent of its 7.0 mgd capacity and receives influent from a Camp Funston line that has I&I problems. Runoff from this site flows in a west-east direction across Dickman Avenue toward Union Pacific rail lines where the topography is the typical lowland type. No storm drains, swales, drainage ditches, etc., are located within the fence line. Building 391 contains a diesel generator for emergency power that is supplied by a UST (the volume of which was unknown by the plant operator). Flammable storage cabinets for solvents and paints are located outside building 391.

Construction previously performed on the west side of the sludge digester has left the soil embankment in this area subject to erosion.

BMPs in place: Not applicable.

Stormwater Pollution Risk Assessment: Exposed soil on the west side embankment adjacent to the sludge digester is a potential source of stormwater runoff contamination. Stormwaters in contact with this area, given the slope of the embankment, can be discharged into the secondary clarifier weir allowing for silt-laden effluent to be discharged into the Kansas River. Runoff from the remainder of the site does not present a pollution risk, given the topography of the down-gradient

area and the absence of a discrete conveyance for discharge to state waters. Ground water contamination through percolation is more of a threat down the gradient from this site.

BMPs Recommended:

- Stabilize the soil bank adjacent to the digester.
- Install a siltation fence and hay bale around the secondary clarifier where silt-laden runoff can discharge into the weir.

12. SLUDGE DRYING BEDS - MAIN POST

The sludge drying beds are located approximately 1,000 yards east of the treatment plant. Sludge is deposited in sloped drying beds with at least 2 inches of concrete freeboard. Water drains lie underneath the drying beds; they discharge into the treatment plant.

BMPs in place: Not applicable.

Stormwater Pollution Risk Assessment: Although located within 600 feet of the Kansas River, discharge of sludge would occur primarily through flooding of the drying beds as the result of a 100-year storm. Otherwise, no stream beds or other conveyances are available to transport sludge to waters of the state during a rain event.

BMPs Recommended: Not applicable.

13. DRMO HAZARDOUS WASTE STORAGE FACILITY AND SALVAGE YARD - BUILDING NUMBERS 1952 AND 1953 AND SITE 1951

The DRMO at Fort X operates facilities for the storage of hazardous wastes generated from base activities as well as storage of waste lead-acid batteries, scrap metals, abandoned automobiles, cannibalized vehicle parts such as transmissions, and vehicle hulks from which parts have been removed. The lead-acid batteries are drained prior to storage at DRMO. Abandoned cars are checked for leaks before on-site storage. Cannibalized parts such as transmissions, fuel pumps, and oil pans are drained prior to storage.

Hazardous wastes are stored in two prefabricated metal structures located on a reinforced concrete slab that slopes toward the back of each unit and contains three pallet-size leak containment basins. The building structures are accessible for loading and unloading through metal roll-up doors that are locked when not in use.

The area between the buildings is paved with concrete with a chemical resistant coating. The concrete surface between the two waste storage buildings serves as runoff control for any spill that may occur or for stormwaters. The pad has 6-inch concrete curbing and slopes toward sumps located at the periphery of the pad. Runoff is directed into these sumps that drain into PVC piping controlled by slidegate valves that are closed at all times.

Drainage from the sump is to a drainage swale that traverses the storage yard in an east-to-west direction. The sumps are allowed to discharge only when inspection of the sumps indicates an accumulation of uncontaminated water. Should there be evidence of contamination, the sumps would be pumped to containers and labeled appropriately.

All wastes received at the facility must be properly containerized and the contents identified. The containers are then stored according to hazard class to avoid incompatible storage. Flammable and ignitable wastes are stored separately from toxic and corrosive wastes and would not flow into the same sump in the event of a spill.

Waste ethylene glycol is stored on a section of the concrete pad that has curbing and spill control through a separate sump. Drums are received in good condition, properly labeled, and stored temporarily prior to sale to a vendor.

Hazardous wastes stored at the DRMO facility include ignitable, corrosive, reactive, and toxic wastes. Toxic wastes include arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, lindane, chloroform, tetrachloroethylene, trichloroethylene, acetone, diethyl phthalate, formaldehyde, methanol, methyl ethyl ketone, toluene, 1,1,1,trichloroethane, xylene, and warfarin.

Spill cleanup material is kept on site within both storage buildings, and site personnel are trained in contingency plan requirements hazardous communications (HazCom) regulations.

Inspections of waste storage areas are conducted on at least a weekly basis. A log is maintained to reflect findings and corrective actions taken.

No evidence of spills is apparent on the storage pad or on the ground around the site.

The entire site, including the salvage storage area, is protected from a 100-year flood by a levee along the east side. The levee also prevents surface water runoff from entering the Kansas River. Flooding from stormwater runoff onto the site is a problem along the east side of the salvage yard.

BMPs in place: Not applicable.

Stormwater Pollution Risk Assessment: The risk to state waters from stormwater associated with the DRMO salvage yard and the hazardous materials storage operation is negligible. The presence of the levee, storage practices in the hazardous waste area, and the manner in which salvageable materials are handled and stored there are adequate safeguards against discharge of contaminated stormwater to the Kansas River or its tributaries.

BMPs Recommended: Not applicable.

14. WASTE POL RAILHEAD ASTs, CAMP FUNSTON – BUILDING NUMBER 1940

Ten railcars of 12,000-gallon capacity are located on a section of the Union Pacific railway adjacent to the north fence line of the DRMO salvage yard. Two of the railcars are used to store a mixture of waste diesel fuel, mogas, and other waste fuel oil grades. These waste petroleum blends are sold to a contractor who pumps them to a tanker truck on a scheduled basis. The railcars are located in a fenced area on a concrete pad with a 2-foot berm. Synthetic rubber hose sections used for transfer of waste fuels are on the concrete pad in the containment area. Those hose sections should be provided with a separate holding area that would contain residue and provide some protection from damage because of mishandling. A number of 55-gallon drums labeled "waste oils" are within the fence line in a separate containment area, one side of which is made of sandbags. The road area outside the fence line shows evidence of oil spillage from the sandbagged area.

Outside of the fence line on the north side, waste oil drums are on unpaved ground. Those drums are in poor condition and oil-tainted soils is in the vicinity of the drums.

There are no tributaries of the Kansas River – intermittent streams, swales, or other "waters of the state" to which oil-contaminated stormwater could be discharged. Runoff from the railcar area would be impeded from discharging into the Kansas River by the levee east of the railcars site.

BMPs in place: Not applicable.

Stormwater Pollution Risk Assessment: Stormwater runoff from this railcar area would be primarily sheet flow, and it would pose a greater risk to soil and ground water than to surface waters.

BMPs Recommended: Not applicable.

15. DEH PESTICIDE STORAGE FACILITY, MAIN POST – BUILDING NUMBER 348

The pesticide storage facility is divided into two rooms. One room is used primarily to store equipment, and the other is used to store pesticides used on the installation. This facility is locked when not in use. An inventory of pesticides in storage is available on a ledger on the outside entrance for use by the Fire Department. An equivalent inventory log is maintained inside as well. Two licensed, full-time applicators are employed by the installation.

Herbicides are the primary pesticide of use by installation personnel. Insecticide work is normally performed by outside contractors.

Pesticides are stored primarily in 5-gallon containers on pallets on a sealed concrete floor with secondary containment. No drains are in the storage area. Ventilation is provided, when necessary, by an axial fan discharging from the west wall of the storage area. Most mixing is performed in the field as is equipment cleaning. Personal protective equipment is available to applicators and is maintained in the storage facility.

Stored materials are not exposed to precipitation. However, it was a practice until 1975 to pour waste pesticide onto the ground and into an in-ground pipe on the northeast side of the facility. This facility is currently in an RI/FS status. Two ground water monitoring wells are located on the northeast side of the facility

adjacent to the fence line. Another well is located down the gradient from the DEH maintenance division high-voltage storage area.

Flow in this area is primarily in a northerly direction into a natural depression in which a concrete stormwater drainage channel has been constructed. This drainage channel eventually discharges into the Kansas River. No soil cover is available on the north side of the building as a result of soil contamination from pesticides and soil erosion. This is an issue of concern.

BMPs in place: Not applicable.

Stormwater Pollution Risk Assessment: Stormwater runoff from this site presents a risk of transporting contaminants to drainage structures that discharge into the Kansas River. Primary pollutants of concern include pesticides discharged from the facility (currently the subject of an RI/FS) and sediment from soil erosion problems.

BMPs Recommended: The soil-contaminated area must be stabilized to reduce soil erosion and the transport of contaminants by stormwater run-off. An impervious cover over the area of concern would be a solution. Plans to apply an asphalt cover to the site are currently under consideration.

16. CUSTER HILL SANITARY LANDFILL

The Custer Hill site is a sanitary landfill permitted by the State of Kansas. The entire site is the subject of an environmental investigation. Ten monitoring wells have been installed around the landfill. Monitoring is ongoing.

The site consists of an active section and a former site that was closed in various stages. The west section of the inactive landfill was closed in 1987. It was in use from 1982 to mid-1987. In addition to receiving solid waste from Fort X, hazardous wastes such as beads used for paint removal and solvent-labeled rags are likely to have been disposed of in this west section. Asbestos waste also was disposed of in the west section of the inactive landfill. In July 1989, the inactive waste site was graded, capped with 2 feet of clay, 6 inches of topsoil, and seeded. A section of the landfill immediately west of the active site was used from 1987 through 1992. It is now closed, capped, and has a vegetated cover.

Entrance to the site is controlled by a gate attendant. A chain link fence surrounds the landfill.

The active landfill on the eastern side of the site is separated from the closed landfill by a dirt road. The north and south ends of the active landfill contain asbestos waste. These sites are closed and are distinguished by mounds covered by topsoil. The area between these mounds is the active site and consists of cells that are used daily and are covered with 6 inches of topsoil at the end of each working day. The active site will be closed by June 1993.

Most of the entire site drains toward the east. A small portion drains in a westerly direction. Both directions lead to tributaries of Three Mile Creek, which is intermittent at these points. The perennial portion of Three Mile Creek is more than 2 miles downstream of the site.

Soil erosion was not evident on the closed portions of the site because vegetative cover seemed to retain soil.

The active portion is more easily eroded at this juncture; however, industrial wastes are not received in this section.

No significant materials are exposed to precipitation at this site given the closure method employed at the inactive section.

BMPs in place: Not applicable.

Stormwater Pollution Risk Assessment: Stormwater runoff from the Custer Hill Sanitary Landfill does not pose a risk to waters of the state. The inactive site has been closed to prevent pollutants from contact with precipitation. The active site is not a source of concern because it strictly has a nonhazardous solid waste disposal function. Thus, industrial or construction debris that might pose a risk of stormwater pollution is absent.

BMPs Recommended: Not applicable.

17. PCB-CONTAINING EQUIPMENT AND STORAGE AREAS

Fort X has a program for inspection, testing, and replacement of transformers, capacitors, or other PCB-containing equipment as prescribed by the Toxic Substances Control Act (TSCA).

Relative to the operation of major substations not controlled by Fort X, Kansas Power and Light (P&L) Company has taken samples of all transformers to test for PCB content. This action was taken after Kansas P&L stated that none of its equipment on the installation contained PCBs in concentrations greater than 50 parts per million (ppm). After a transformer at the tank range was found to be PCB-contaminated, Kansas P&L began sampling rather than rely upon the labels on electrical equipment.

The DEH high-voltage storage area located east of Main Post building 348 is a secured area used for the storage of electrical equipment. Capacitors stored in this area were labeled as non-PCB containing in accordance with TSCA regulations.

In 1979, DEH personnel conducted a nameplate survey of in-service electrical equipment to identify items with potential for PCB content. All items were labeled accordingly. Presently, when electrical equipment is being serviced or replaced, it is tested for PCB content.

PCB-laden items to be tested are stored in drip pans in Main Post building 343. Those found to be less than 50 ppm are labeled and used or put into storage. Electrical equipment with greater than 50 ppm of PCB content is labeled and stored in a curbed area for disposal by a licensed vendor. The building itself is open-faced with a fenced entrance that is normally locked. The floor is cement and slopes toward the front of the building. The sides of the building are corrugated sheet metal, but they are not completely flush with the floor in all areas. Water flow in this area is from north to south. Two grated storm drain catchments in the vicinity of building 350 and the cylinder storage area provide drainage for this section of DEH-owned and operated structures.

Significant materials potentially exposed to precipitation include PCBs stored in building 343.

BMPs in place: Not applicable.

Stormwater Pollution Risk Assessment: PCBs stored in building 343 could be exposed to precipitation because the building is not fully enclosed. Drip pans could overfill during rain either from direct contact with precipitation or from leakage around the building foundation. The building floor is sloped so that any spills occurring inside can flow out the front during rain and discharge into storm drains.

BMPs Recommended: The storage building (343) must be made more water-tight and provided with a means to prevent spilled liquid from flowing out the front. This could be accomplished by enclosing the front yet allowing for entrance of equipment or personnel by use of an overhead door or equivalent. The floor of the building front could also be sloped to direct liquids to a sump to collect spills or rainwater. This sump should be constructed of sealed concrete and its contents either pumped to drums or onto the pavement, depending on PCB content.

An alternative is to use conex containers similar to those used for hazardous waste storage at DRMO.

18. DEH MACHINE SHOP, MAIN POST - BUILDING NUMBER 332

This building is used for maintenance of DEH vehicles and for steam or hot water cleaning of such vehicles. The inside consists of a maintenance bay the length of the building as well as small shops connected to the main bay.

The outside of the building is used to store a variety of petroleum products, both raw materials and waste, as well as to use steam or hot water to clean vehicles.

Raw materials such as hydraulic oil, motor oil, lubricating oil, and other petroleum products used during vehicle maintenance are stored outside the facility on the south side. This storage area is asphalt paved and secured by chain link fencing around the maintenance area. Storage of the raw materials is primarily in 55-gallon drums in a horizontal or vertical position on pallets or in storage racks. Evidence of spills is on the hardtop.

Waste diesel fuel and antifreeze in 55-gallon drums are also stored in the paved area on the south side of the facility. These containers are not provided with any accumulation date labeling and are stored in small lean-to structures exposed to precipitation from the open front and the sides. The roof is of sheet metal construction and is sloped toward the back. The sides are also of sheet metal and are

open at the top. Evidence of spillage from these structures is on the asphalt paving in their vicinity.

Lead-acid batteries are stored in similar lean-to structures adjacent to the waste oil storage areas. The batteries are exposed to precipitation from the fronts and sides of the lean-to structures. Batteries from nonmilitary vehicles are removed by a contractor for recycling. Military vehicle batteries are sent to the DX facility in building 8100.

Two ground water monitoring wells were installed in 1992 after the removal of three USTs from the southeast side of the facility. One of the wells is located on the grassy slope on the southeast side while the other is east of the facility on the sloped area west of a section of the Union Pacific railway.

Building 354 is located on the southeast side of the maintenance facility; it once was a fuel station but is no longer in use. This station was used to dispense gasoline and also may have dispensed diesel fuel. The shop supervisor believed that two USTs were removed from adjacent to this building; this needs to be corroborated.

One UST is currently in use and is located in the tire storage area, a section of the main building (332) located on the southeast side. This tank was installed in 1982 and is used to store waste oils originating from the maintenance shop. Tank capacity is 1,000 gallons. The tank's construction material is listed as fiberglass in the DEH UST data base. This tank is inventoried daily using a measuring stick with water-sensitive paste. The daily inventory log shows no evidence of material loss or the presence of water. Soil vapor testing in the vicinity of the tank was conducted in 1992 with results indicating no evidence of soil vapor gases of significant concentration to require further integrity testing. Waste oils from the UST and drummed waste oils are removed to be recycled by an outside contractor.

The compressor room on the west end of the facility has a floor drain into which condensate is drained. Whether this drain discharges to a stormwater or sanitary sewer network needs to be evaluated. An open 6-inch diameter pipe is at floor level in this room, which does not seem to serve any function. This pipe may have received blowdown from a Kewanee boiler that was removed from this room.

The oil room on the south side of the shop is used to dispense a variety of fluids such as hydraulic oil, motor oil, lube oil, transmission oil, etc., for use in the

maintenance bay. This room has a floor drain that needs to be evaluated regarding its ultimate discharge connection.

The small-engine repair area along the south side of the shop discharges waste oils into the 1,000-gallon UST from a sink in the main bay area.

One 55-gallon drum of sorbent material is available for spills inside the shop areas. Absorbent pads are also available for spill containment. Similar spill containment equipment is located in the outside storage area.

The main maintenance bay has two grated floor drains to capture spillage from vehicles being worked on in the area. Drain pipes in these sumps discharge toward the west end of the facility; they must be evaluated relative to ultimate discharge points.

The SPCC/ISC plan calls for the Fire Department to be called to respond to spills in the maintenance area and surrounding grounds. Shop personnel are given RTK training and training in contingency plan implementation.

Vehicle cleaning is conducted adjacent to building 331; it is referred to as the "wash building." This area is located on the west side of building 332. Both hot water and steam cleaning are provided. Vehicles are positioned on a concrete apron with a grated concrete trough. The trough discharges to a culvert that is partially blocked to allow sediment to settle out of it.

Another grated stormwater sump with two discharge pipes is located adjacent to the west end of the wash building. One pipe discharges into the vehicle wash trough while the other discharges in a southerly direction toward a drainage channel about 50 yards down the gradient. The topography in the vehicle wash area is such that precipitation runoff and wash waters from vehicle cleaning that is not contained by the grated trough would flow toward the curbed entrance to the maintenance shop into storm drains on Marshall Boulevard. A soil pile contaminated with a petroleum-based substance was located on the ground on the west side of the wash building in the vicinity of the stormwater sumps.

Flow patterns for the maintenance facility are predominately in a southerly direction for the outside oil storage area and westerly direction for the vehicle wash area and for the north side of the building. Three roof drains are on the north side of building 332. One roof leader drains to a ductile iron in-ground pipe, a second

discharges to a grated storm drain, and the third discharges to an open storm drain in the concrete curbing at the northwest corner of the shop.

Stormwater drains in the area of the maintenance shop and stormwater runoff ultimately seem to drain into a concrete-lined drainage channel that emanates from under Marshall Boulevard, west to a culvert under the Union Pacific railbed and Henry Road, past the Community Affairs Office, and then under a dirt road to a stream bed that is a tributary of the Kansas River. This drainage channel appears to coincide with the location of an intermittent stream that flows through the Main Post as seen on the installation's 1:50,000 scale map. The channel is 7 to 8 feet high, 8 to 10 feet wide, with culverts along its sides from which stormwater is discharged. The channel contains sediment in a number of areas, and oil-tainted water was present in the area near the Community Affairs Office.

BMPs in place: Not applicable.

Stormwater Pollution Risk Assessment: The potential for stormwater contamination associated with activities in and around the DEH maintenance shop is significant. Petroleum products, both raw materials and wastes, are stored in a manner in which spills occurring while loading and unloading containers will not be contained; instead, they will be discharged with runoff during a rain event or permeate the area unabated, allowing for future contamination. Storage lean-to structures are readily subject to precipitation. The runoff that contacts drums will most likely contain petroleum contaminants.

The manner in which lead-acid batteries are stored exposes them to precipitation and stormwater runoff. They may contain acidic electrolyte as well as trace metals such as lead. Runoff from the storage areas could reach the storm drainage channel south of the maintenance shop, although some attenuation would be provided by the grassy slope between those areas. Ground water pollution would be a consideration as well.

The UST in the tire shop is not directly exposed to precipitation and would only pose a problem if the tank were to be overfilled, causing spillage to leak to the outside. This potential stormwater contamination impact is mitigated by undertaking daily inventory testing, but only if no additional wastes are allowed to accumulate in the tank when stored wastes reach a predetermined level.

Given the extensive stormwater drainage systems around the maintenance shop, petroleum fluids from the maintenance bay and adjacent shop floor drains and the compressor room condensate may discharge into this stormwater drainage system. A cross-connection survey using piping schematics, dye testing, etc., would identify where those cross connections exist.

Discharge to stormwater drainage system from the vehicle washing area must be addressed. Oil- and sediment-contaminated waters are discharged into the storm drain system from vehicle washing and discharge to the concrete-lined drainage way south of the site. In addition, oil-contaminated soil removed from the trough and allowed to accumulate in an uncontained manner is a source of stormwater generated pollution that could enter a drain system that ultimately discharges into waters of the state.

BMPs Recommended:

- Provide secondary containment in the form of curbing for the outside storage areas. The curbed containment areas should be sealed and provided with a sump and slidegate to allow for the discharge of uncontaminated stormwaters accumulating in those areas. An alternative is to provide conex-type storage so that containers and batteries are not exposed to precipitation, and spills from loading or unloading are contained for immediate cleanup. Drums must be inspected daily and labeled as to contents in a conspicuous location on the drum. Drums that are rusting or show signs of deterioration or damage should be overpacked or have their contents transferred to another container.

- Provide waste-oil pipelines leading to the UST with a valve that can be closed when the level in the tank is at a point where additional input would result in loss of contents through vent piping. That valve should be designed to be capable of being locked in the closed position to avoid tampering. The lock should be installed or removed only by designated personnel, such as the shop foreman or the person performing daily inventory for the UST.

- Identify and eliminate nonstormwater discharges. Those discharges include those that may come from shop floor drains and compressor room drainage. The open pipe in the compressor room should be capped. (Non-stormwater testing certification is referenced in a separate section of the SWPPP.) Floor drains should be connected to a holding tank or to the sanitary sewer system. In the latter case, an oil-water separator is recommended to reduce the impact on sanitary treatment works.

- Inspect oil-water separators at least weekly. Records of inspections should be kept. Facility personnel must be trained in the operation of separators and gauging procedures so they can remove oil or sediment at a predetermined accumulation point in the unit.

- Install oil-water separators in the drainage system for the vehicle wash area. The separator should have an over/under baffle network to separate oil and sediment from stormwater flow. The separator must be inspected at least weekly and pumped out when appropriate.

- Remove certain sediment from the catchments in the wash area in a manner that prevents contact with precipitation. This could include containerization in drums with the contents labeled or provided with impermeable cover until removal and disposal.

- Regrade the hardtop around the wash area so that all wash waters are directed toward the drainage system for this area and are not allowed to flow onto Marshall Boulevard.

19. DOL SERVICE DIVISION LAUNDRY AND DRY CLEANERS AND GENERAL PURPOSE WAREHOUSES, MAIN POST - BUILDINGS 180, 181, AND 183

Building 183 is the present PX laundry and dry cleaning facility and is located on the north side of Custer Road opposite buildings 180 and 181, which are now warehousing operations but once were the laundry and dry cleaning sites. Building 183 is operated by a contractor. These sites are undergoing environmental investigation as a result of perchloroethylene soil and ground water contamination. The remainder of this narrative addresses the impact of the site investigation on stormwater runoff from those sites.

Runoff from these sites flows primarily in a north-to-south direction. Stormwaters from building 183 roof leaders discharge onto the asphalt paved area on the south side of the facility. A grated stormwater drain with outlet piping is adjacent to the southeast corner of the building; it discharges into a stormwater drainage network that ultimately flows into tributary A south of building 180. A grassy slope south of building 183 allows for runoff to flow onto Custer Road and onto the grounds of buildings 180 and 181.

A grassed "island" in the north side of the paved entrance and parking area for building 180 contains a grated stormwater catchment whose outfall piping was not visible from ground level. Another drainage basin with outflow piping allowing for flow to the east is located adjacent to the north side of this facility. A concrete

drainway cut into the east side of the curbed asphalt parking area is an additional conduit for directing flow to tributary A.

Surface water flow from the west and south sides of building 180 follows the slope of the land in those areas, which is predominantly south to southwest into tributary A.

Ground water monitoring wells are located in several areas around the facilities. One well is located on the grassy slope on the south side of building 183, while four sites are on the grounds of buildings 180 and 181.

Locations for soil gas readings are evident on the north side of building 180 in an east-west pattern. Also, a pit is located on the southeast side of building 180 with a soil pile adjacent to the excavation. Another pit and soil pile are located on the northeast end of the slope south of building 183, as are soil gas reading sites.

Tributary A flows in a southwest direction and connects with tributary B, which is a tributary of the Kansas River. Tributaries A and B are intermittent streams although flow is evident in tributary A.

Soil gas readings for perchloroethylene were high along a sewer line servicing building 183. Both ground water and soil samples from building 180 have tested positive for perchloroethylene.

BMPs in place: Not applicable.

Stormwater Pollution Risk Assessment: Stormwater runoff from these sites is contaminated when ultimately discharged into tributary A. This occurs as a result of contact with soil contaminated with perchloroethylene.

BMPs Recommended: Contamination of stormwater will continue as long as perchloroethylene soil and ground water contamination exist. As part of this abatement process, an ongoing site investigation is being conducted to locate contamination "hotspots" and the likely source of the contamination. The results of that investigation will be used to identify a method to remediate the contaminated areas.

In the interim, we recommend that where contaminated soil piles are generated from excavations related to a site investigation, they should be secured with water-impermeable cover to reduce the potential for stormwater runoff contamination. The

contaminated soil could be deposited on tarps and covered with an impermeable material and controlled by a means (e.g., sandbagging) to divert runoff from those piles.

Runoff from building 183 should be diverted to stormwater drainage systems where feasible, to avoid contact with contaminated areas such as the slope on the south side of this site.

20. SOUTHEAST FUNSTON LANDFILL

The (inactive) Southeast Funston landfill is undergoing a separate site investigation for which an RI has been forwarded to EPA. The site is approximately 6 to 7 acres and is located southeast of Camp Funston; it is adjacent to an inactive incinerator from which ash was landfilled at the site. The landfill is bounded by the Kansas River on the east and is transected by Route 18. The landfill received a variety of wastes from Fort X and from the incinerator. Soil from a firing range is used as a cover at this site. The soil contains lead fragments from the firing range. Most of the landfill site is well vegetated; yet, some erosion is evident, especially adjacent to the Kansas River where the river bank must be stabilized. Surface runoff flows primarily to the east and southeast. The site was closed in 1981 pursuant to RCRA Subpart D criteria. It will most likely be closed pursuant to CERCLA criteria given ground water contamination found in monitoring wells located around the site. The primary contaminants of concern at this site include metals (lead) and volatile organics. No discrete conveyances are available for surface runoff from the site. The runoff reaching the Kansas River is primarily sheet flow. However, soil fissures, resulting from erosion and adjacent to the river, are a potential source of contaminated stormwater runoff to the Kansas River.

BMPs in place: Not applicable.

Stormwater Pollution Risk Assessment: For the most part, the landfill does not pose a risk to state waters because of the ability of vegetated areas to prevent erosion of topsoil. However, some parts of the site require better maintenance of cover to prevent soil erosion or contaminated runoff from reaching the Kansas River. Areas of the riverbank have eroded and have resulted in natural drainage ditches that could transport soil contaminants from runoff and expose contaminated layers in the landfill to stormwater runoff.

BMPs Recommended:

- Properly maintain areas of the landfill from which cover has been removed. This normally can be done by revegetating these areas.
- Stabilize the riverbank along certain sections of the Kansas River to preclude contaminants from being transported by stormwater runoff as a result of "sloughing." Stabilization can be in the form of riprap, gabions, or other soilbank stabilization techniques.

21. AUTO CRAFT SHOP AND CAR WASH – BUILDING NUMBERS 7754 AND 7756

The auto craft shop and car wash provide soldiers with a place to perform maintenance and repair on their privately owned motor vehicle. The shop has areas for engine rebuild, radiator repair, transmission repair, and routine preventive maintenance (such as lubrication and oil changing). Personnel are very conscious of potential environmental damage from the accidental or indiscriminate discharge of waste oil, antifreeze, or solvents.

Waste oil from oil changing is discharged to a 1,000-gallon underground tank. Throughout the shop, floor sweeping compound is used to clean up oil that is accidentally spilled. The engine rebuild shop has two caustic tanks and a rinse tank. The radiator repair shop also has caustic tanks with still rinse tanks. Rinse water is treated as hazardous waste. Waste solvents are collected and disposed of by a contract with Safety-Kleen. Water used for floor washing is discharged to the storm drainage system.

The car wash discharges into settlement tanks for solids removal. The water is conveyed to the stormwater system. Oil separators are unavailable. Detergents are used for vehicle washing so that any oils that are removed during washing would be emulsified; collection or separation of oily waste would be difficult.

BMPs in place: Not applicable.

Stormwater Pollution Risk Assessment: Drainage of water from floor washing in the shop and waste waters from the car wash are discharged through the stormwater drainage system into an intermittent stream. However, the actual pollution impact is relatively low because material washed from shop floors is primarily grit, and washrack waste water normally does not contain oil as a contaminant. Caustic tanks are not provided with drain lines, thereby eliminating

this corrosive material as a potential contaminant to state waters through cross connections to a stormwater drain system.

BMPs Recommended:

- Closely monitor equipment and areas with potential for spills into storm drainage channels.
- Request servicing of pollution-control devices in a timely manner.
- Ensure proper collection of waste solvents and caustic tank rinses. These materials require proper containerization, labeling, and storage in areas dedicated for accumulation of hazardous wastes. Train personnel handling those waste streams. Supply protective equipment for personnel.
- Request programming of appropriate pollution-control devices.
- Ensure quick cleanup of spills.
- Continue to maintain proper storage of chemicals.
- Document all preventive maintenance activities.

22. AIRFIELD JP4 FUEL STORAGE AND ISSUE POINT – BUILDING NUMBER 700

All fuel storage tanks are underground. Clay lies beneath the area. Operations personnel closely monitor fuel quantities, including temperature measurement, to ensure that no tanks are leaking. A leak was recently discovered in an aboveground pipe; it was immediately shut down until repairs could be made. At the fuel dispensing points, collection lines lead to three fuel-water separators in the control building. Separated fuel is discharged into a waste fuel tank; water is discharged to the storm drainage system. Waste fuel is frequently used by the Fire Department for training at its burn pit. Delivery to the site is by commercial fuel tank trucks with direct hose connections to the tank fill points.

BMPs in place: Not applicable.

Stormwater Pollution Risk Assessment: The potential for contaminated stormwater runoff to discharge into state waters is minimal. Operations personnel closely monitor all activities: they inspect for fuel leaks in piping and monitor tank liquid levels to avoid spills caused by overfilling tanks. All fuel deliveries are closely monitored by facility personnel. Thus, there appear to be adequate safeguards against stormwater-contaminated discharges into state waters.

BMPs Recommended:

- Closely monitor equipment and areas with potential for spills into storm drainage channels.
- Perform regularly scheduled preventive maintenance of pollution-control equipment and ensure its timely repair.
- Regularly service fuel-water separators.
- Perform frequent and periodic inspections of the area to provide quick response in the event of a leak. Maintain records of such inspections and any corrective actions taken.
- Monitor all fuel transfer operations.
- Continue to monitor fuel *levels* in tanks (including taking temperature measurements) to allow for adjustments resulting from expansion/ contraction. Provide for high-liquid-level sensing devices or automatic means of terminating tank filling operations.
- Document all preventive maintenance activities.

23. FIRE DEPARTMENT TRAINING FACILITY, BURN PIT – (FACILITY 892)

The burn pit is a curbed concrete platform about 75 feet by 75 feet with a drain to a fuel separator. Separated fuel is discharged to a waste fuel tank and water is discharged into a storm drainage ditch *discharging to waters of the state.*

BMPs in place: Not applicable.

Stormwater Pollution Risk Assessment: Waste fuels could conceivably spill onto the surface area outside the burn pit during training preparation activities. Petroleum-based materials could be transported into the adjacent stormwater drainage system with runoff. A stormwater event could also result in discharge of petroleum contaminants into drainage systems from oil-water separators.

BMPs Recommended:

- Require regular servicing of fuel-water separators and ensure timely repairs of the facility.
- Closely monitor equipment and areas with potential for fuel spills that would flow to storm drainage channels.
- Maintain spill response equipment on a schedule.

- Respond to spills in a timely manner using personnel trained in spill clean up procedures and provided with appropriate equipment.
- Document all preventive maintenance activities.

24. MARSHALL FIELD – BUILDING NUMBERS 727, 741, 817, AND 820

Building 817 is an organizational hangar used primarily for parking helicopters. In this hangar, helicopters are washed with low-pressure garden hoses, using liquid dishwashing detergent. No separators are used. Nonsanitary waste water is discharged directly into the storm drainage system. During warm weather, aircraft are washed outdoors. Also, exterior washracks are not provided with separators. In general, little or no maintenance is performed in this facility.

Building 741 is a hangar belonging to the medical unit. Like building 817, helicopters are parked and washed inside during cold weather. No separators are used. Nonsanitary waste water is discharged into the storm drainage system.

Building 727 is a contractor-operated maintenance hangar. The contractor performs all types of maintenance required for the aircraft. No fixed-wing aircraft are stationed here. Waste liquids are collected and stored in drums in a covered storage shed. No oil-water separators are used. Nonsanitary waste water is discharged into the storm drainage system.

Building 820 is a motor maintenance shop. It is similar to other motor maintenance shops at Fort X. Four-wheeled vehicle maintenance platforms are used for Q-servicing. Vehicle washing is not permitted at the airfield. Waste oil is collected in waste oil tanks and removed per the provisions of a DEH contract. Solvents, antifreeze etc. are also disposed of pursuant to a DEH contract.

BMPs in place: Not applicable.

Stormwater Pollution Risk Assessment: Aircraft wash waters can be discharged along with stormwater runoff to state waters. *These waters contain detergents and petroleum-based products removed from aircraft during washing.* Precautions are taken at hangar 727 to collect waste solvents, oils, etc., and store them in a manner that minimizes stormwater contamination.

BMPs Recommended:

- Closely monitor equipment and areas with potential for spills to storm drainage channels.
- Perform regular service on fuel-water separators and ensure performance of timely preventive maintenance and repair of all pollution-control equipment. Maintain records of such activity.
- Provide for regularly scheduled inspections and testing of pollution-control equipment.
- Request programming of appropriate pollution-control devices, especially oil-water separators and aircraft washrack facilities. Evaluate the feasibility and value of diverting the discharge of maintenance facilities' waste waters from the stormwater system to the sanitary sewer system.
- Document all preventive maintenance activities.

25. GOLF COURSE – BUILDING NUMBERS 5202 AND 5205

The golf course uses POL products, pesticides, and fertilizers. Four POL storage tanks are elevated on a steel frame. Two of these are diesel tanks while the others are for mogas and marine fuel (a mixture of mogas and diesel oil). The tanks are located above a graveled area. A minor spill (less than 1/2 pint) is evident under one of the diesel tanks. All lawn mowers are stored outside in a graveled area when not in use. No apparent oil or fuel leaks were seen in the mower storage area. Batteries are sent to the auto craft shop when they must be charged or replaced. Battery fluids are not drained prior to forwarding them to the auto craft shop. Pesticides and fertilizers are stored in the service building. In the pesticide room, floor drains lead directly to an underground storage tank for containment in the event of a spill. Two types of fertilizer are used: 37-0-0 and 31-0-0. No fertilizers are used in areas adjacent to drainage ditches. This also applies to herbicides.

BMPs in place: Not applicable.

Stormwater Pollution Risk Assessment: A potential always exists for fertilizers and herbicides to discharge with stormwaters into drainage ditches. However, that potential is minimized by not applying these materials in areas where such a discharge would likely occur.

Stormwater contamination and subsequent discharge into storm drainage systems from the POL storage area can occur.

Soil erosion is a consideration during reconstruction of tees or greens.

BMPs Recommended:

- Closely monitor equipment and areas with potential for spills into storm drainage channels.
- Request programming of appropriate pollution-control devices.
- Perform frequent and periodic inspections to ensure proper storage of chemicals, fertilizers, and POLs.
- Provide for cleanup of spilled pesticide and the proper containerization and disposal of these and other waste materials generated from facility operations. Adhere to the provisions of the SPCC and ISC plans related to training and spill response.
- Document all preventive maintenance activities, inspection findings, and recommendations.
- Mitigate soil erosion through such measures as mulching, jute mats, nets, or other soil stabilization measures.

26. ARMY AND AIR FORCE EXCHANGES SERVICE STATION – BUILDING NUMBER 218

The service station sells gasoline and various automotive products (e.g., cans of oil, antifreeze, and cleaning compounds) and offers lubrication services. No fuel separator is in the stormwater drainage system for this facility. Oil from automobile servicing is drained into 55-gallon waste oil drums behind the service station. Most oil spills that occur are minor in magnitude and are cleaned up with rags that are placed into a container designated for these items. These rags are disposed of through a contractor. The facility appears to be in excellent condition from a housekeeping perspective. No evidence of spilled liquids exists. In the event of a major fuel spill, the Fire Department would be contacted pursuant to the installation's SPCC/ISC plans. Motor fuel is delivered by commercial fuel tank trucks with direct hose connections to storage tank inlets (i.e., USTs).

BMPs in place: Not applicable.

Stormwater Pollution Risk Assessment: The risk to stormwater is primarily that arising from leaks or other discharges of gasoline and other POLs during vehicle servicing. Drainage from this area flows to the main road through a stormwater drainage system down the gradient from the service station.

BMPs Recommended:

- Closely monitor equipment and areas with potential for spills to storm drainage channels.
- Request programming of appropriate pollution-control devices.
- Assure quick cleanup of spills.
- Maintain proper storage of chemicals and POL products to avoid direct contact with precipitation.
- Document all preventive maintenance activities and inspections of storage areas.
- Consider regrading the dispensing area to divert runoff to oil-water separators that discharge to a stormwater drainage system.

27. WATER TREATMENT PLANT

The water treatment plant is a newly constructed rapid-sand-filter plant that uses ferric chloride with a polymer for coagulation, lime and carbon dioxide for pH control, and that adds fluoride. Filter backwash is not discharged into the environment. The plant uses four lagoons to which all filter backwash is conveyed. Supernate from these sedimentation structures is discharged into the plant influent. Sludge is removed from the lagoons as required. The total volume of the lagoons is approximately 12 million to 15 million gallons, thus providing sludge storage for several years. Sludge removal should be conducted by pumping free liquid from the lagoon, emptying it prior to the onset of cold weather, allowing the iron sludge to freeze, and then removing it as soon as it thaws. This permits ready dewatering of the sludge, which will have a granular consistency and which may be used as fill material. All chemical deliveries to the plant are made by commercial vehicles.

BMPs in place: Not applicable.

Stormwater Pollution Risk Assessment: The risk of pollution to state waters via stormwater runoff associated with plant operations is minimal. The plant is undergoing construction activity and poses some risk from a sedimentation and erosion control perspective.

BMPs Recommended:

- Closely monitor equipment and areas with potential for spills into storm drainage channels.
- Request programming of appropriate pollution-control devices.
- Perform regularly scheduled, periodic inspections and testing of pollution control equipment. Perform regularly scheduled preventive maintenance to ensure proper operation of the equipment.
- Perform frequent and periodic inspections to assure proper storage of chemicals and to provide quick response in the event of a spill.
- Document all training, inspection, and preventive maintenance activities.
- Use the appropriate soil erosion stabilization techniques, such as vegetative ground cover, mulching, siltation fence, or hay bales.

28. CENTRAL VEHICLE WASH FACILITY

The central vehicle wash facility (CVWF) consists of a three-lane bath prewash site (two tracked lanes and one wheeled lane) followed by manual wash stations. Waste water discharges from each of those two wash areas flow to dual-cell sedimentation basins and then combine and flow to a series of four treatment ponds or lagoons. Another lagoon associated with the old CVWF (now closed), receives industrial waste water flows from most facilities on Custer Hill and from stormwater. That lagoon overflows into the new CVWF lagoon system. Wash water for the CVWF is recycled from lagoon number 4. In addition, lagoon number 4 overflows to an intermittent stream. Presently, CVWF waste water bypasses lagoon number 2. But, the industrial lagoon overflows into lagoon number 2 and then to lagoon numbers 3 and 4. None of the lagoons is lined; this permits the possibility of infiltration into the substratum. Precipitation in the washrack areas will pass through the treatment system or may be bypassed into a drainage ditch.

Figures IV-1 and IV-2 illustrate washrack and treatment system schematics for systems such as those used at Fort X.

BMPs in place: Not applicable.

Stormwater Pollution Risk Assessment: Industrial waste waters are discharged from operations in the Custer Hill area into the industrial sewage system connected to the lagoon associated with the old CVWF. Overflow from this lagoon into the new CVWF lagoons may discharge from lagoon number 4 into state waters. Overflow from the lagoon is not an occurrence that necessarily requires a stormwater event as a precursor, and it may require structural modification to avoid any contamination of adjacent state waters. Stormwater runoff from the individual wash stations presents a potential risk to state waters from oils entrained in such runoff.

BMPs Recommended:

- Closely monitor equipment and areas with potential for spills into storm drainage channels.
- Request programming of appropriate pollution-control devices. One problem area appears to be the washing of vehicles and the performance of cleaning associated with Q-servicing at old motor pool washracks. These areas must be provided with oil-water separators. Using detergents and solvents in these areas to remove grease and oil may also emulsify them – making them more difficult to remove waste streams through conventional methods (e.g., oil-water separators and skimmers). The use of materials that emulsify oils may have to be avoided or the waste streams may have to be treated to eliminate colloids (e.g., addition of polyelectrolytes or acid-ification).
- Perform regularly scheduled preventive maintenance of pollution control equipment and ensure its timely repair.
- Perform frequent and periodic inspections to provide quick response in the event of a spill.
- Document all preventive maintenance activities, training, and inspections related to stormwater contamination.
- Ascertain that tracked motor pools are provided with scheduled maintenance platforms specified for tracked vehicles and not with platforms for wheeled vehicles.
- Provide containment in the wash station section of the CVWF to ensure that waste waters and stormwater contaminated with waste water (from vehicle washing) are directed to drains that discharge to treatment devices that

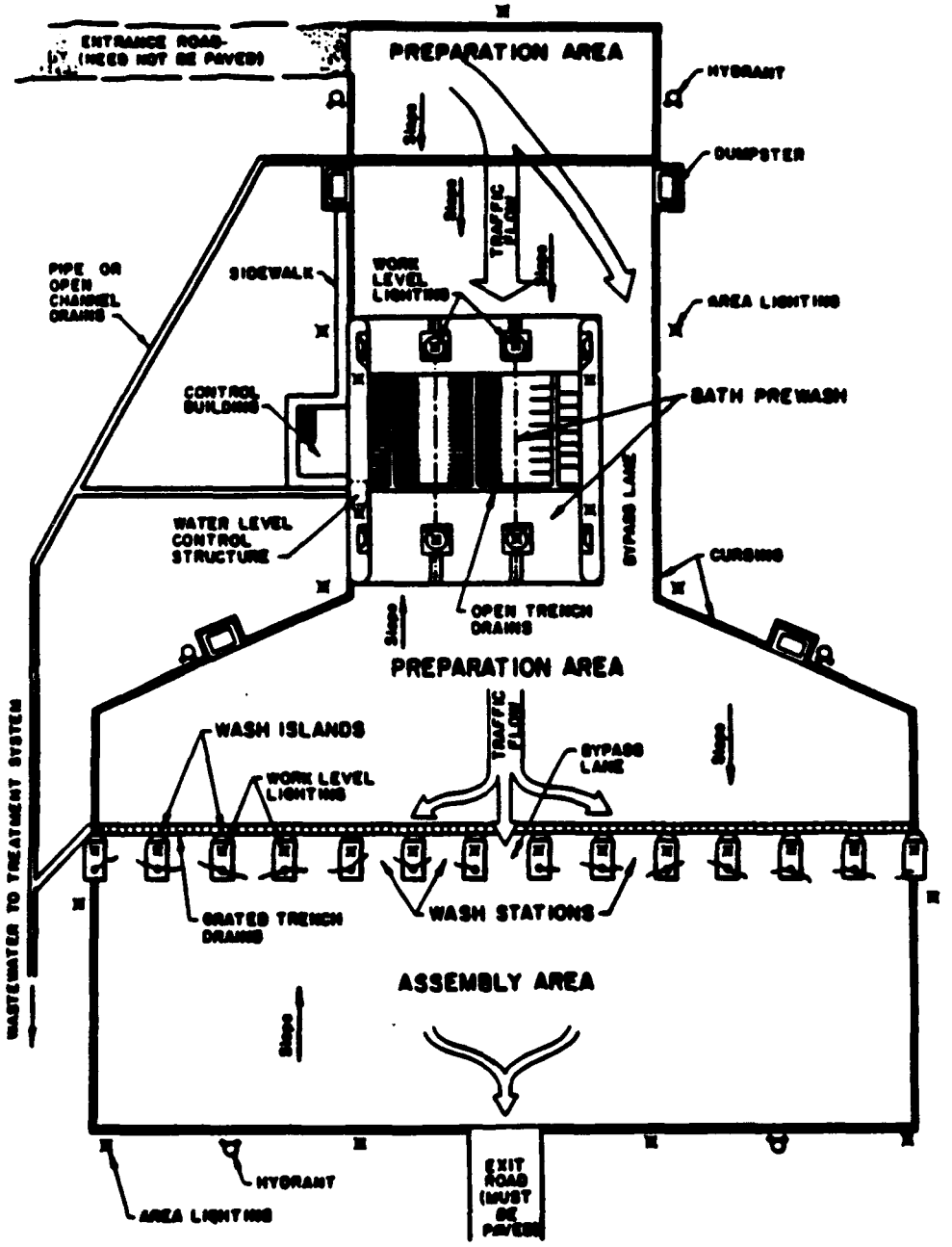


FIG. IV-1. CENTRAL VEHICLE WASH FACILITY PLAN WITH BATH PREWASH

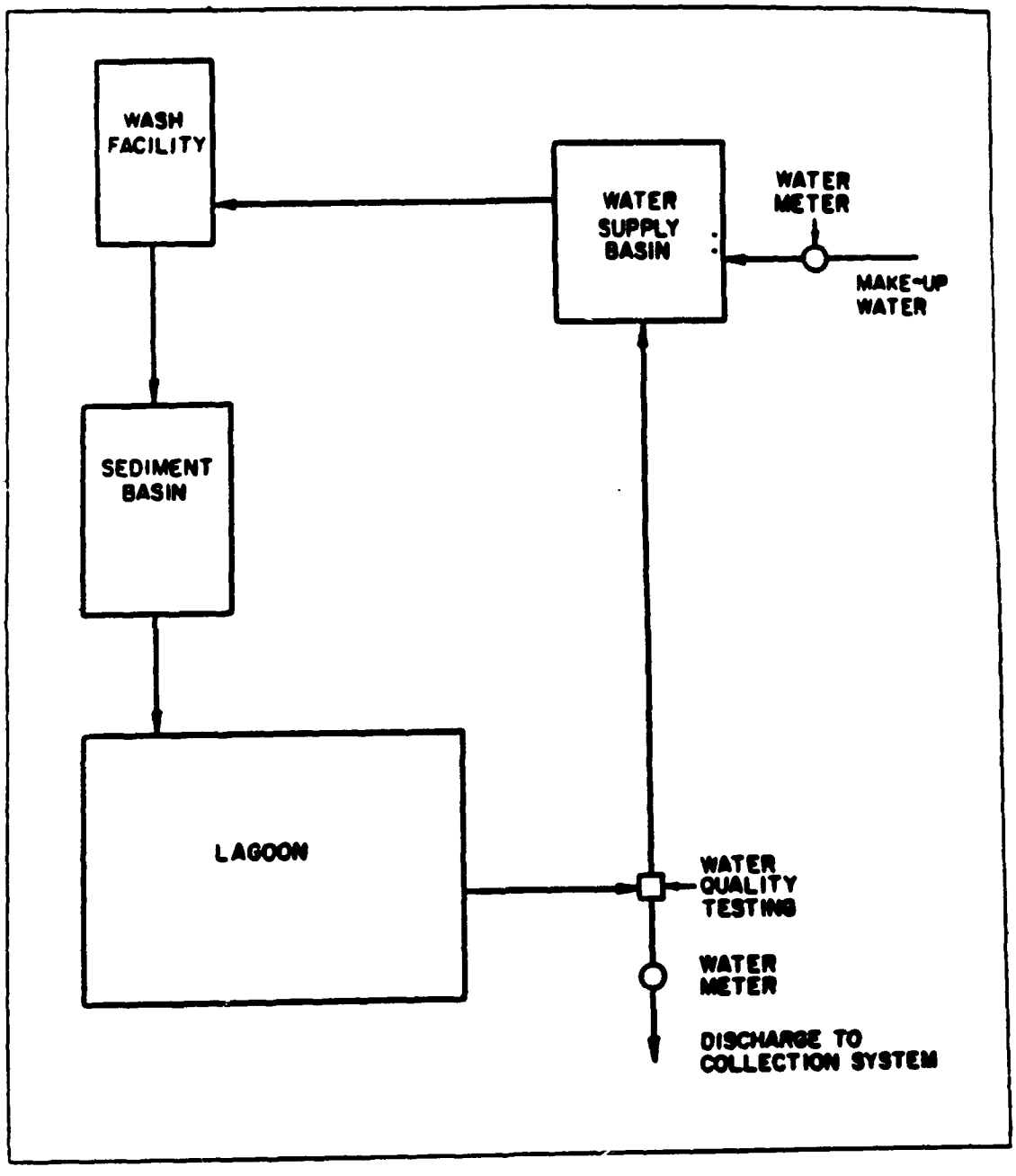


FIG. IV-2. GENERAL FLOW SCHEMATIC OF A LAGOON SYSTEM

removes oils, greases, etc., prior to discharge to stormwater drain systems. Wash area gradings also should be maintained to allow for diversion of wash waters to appropriate drain lines.

29. SEDIMENT AND EROSION CONTROL

A formal Sediment and Erosion Control Plan has not been developed for the installation. The Natural Resources Branch of DEH is in the process of developing that plan as part of the ITAM.

The plan will address sedimentation and erosion control measures required in training areas; rebuilding of roads; and ground reclamation adjacent to gulleys, swales, and so forth.

Installation engineer units must obtain and review "digging requests" from the Natural Resources Branch prior to digging. Sediment and erosion control measures are identified during this process and included in the "digging request" authorization.

The Natural Resources Branch does not become involved in outside contractor work when erosion control may be an issue. Contracts for this type of work are supposed to contain provisions for sediment and erosion control. It was noted during the site visit that contractor excavation work along the north side of Huebner Road in the Camp Funston area had resulted in the accumulation of soil piles on the banks of drainage channels without any means of controlling sediment-contaminated runoff from these excavation piles.

One of the areas of concern relative to the potential for sediment and erosion control is stream crossings used by tracked vehicles such as tanks. To reduce this potential, approach angles are devised to be greater than 9 percent. In addition, a "hard base" is set to eliminate a totally "wet" crossing. Without a hard base, water at crossing areas can get "pooled" up; then, tracked vehicles transport water and sediment to other areas where erosion may occur. Depending on the type of stream and its depth, hard crossings can consist of a foot or more of 10- to 14-inch rock bottom and 3 inches of 3-inch rock on top; in some cases, the crossings are constructed of concrete or culvert.

SECTION V

SPILLS AND LEAKS

It is the policy at Fort X to maintain the capability to respond to, contain, and clean up spills of oil or substances hazardous to the environment. The SPCC/ISC plan provides guidance about response procedures to be implemented in the event of a spill of a hazardous substance that poses a risk to human health or the environment. That plan highlights activities or areas where spills may occur, evaluates the adequacy of any spill containment measures in effect, and determines the availability of spill containment equipment. That plan, in conjunction with the SWPPP, is a mechanism to at least mitigate (if not eliminate) the impact on the environment of significant spills, including the contamination of stormwater runoff.

No spills of oil or hazardous substances of a reportable nature have occurred at Fort X for at least 12 months prior to the date the plan was first implemented. The criteria used for reportable or significant spills are contained in Section 311 of the Clean Water Act, in Section 102 of CERCLA, and/or in state equivalent criteria. Inspection of the "spill" log at DEH does not indicate any occurrence of a significant spill at areas exposed to precipitation that drain to stormwater conveyances leading to state waters.

Sites within the cantonment area that pose a risk to stormwater runoff from the release of significant materials are undergoing environmental assessments to arrive at remedial measures that may be necessary to eliminate risk to human health and the environment. The sites that impact stormwater include the DEH pesticide storage area and the post laundry (historical and current sites) area. The significance and the efforts underway to evaluate their environmental impacts are indicated in the SWPPP.

Designated DEH personnel will continue to maintain a log of significant spills including those that contaminate stormwaters.

SECTION VI

SAMPLING DATA

Sampling for pollutants in stormwater discharges has not been conducted as of the time of the writing of this SWPPP. If such sampling does occur, a summary of sampling data results will be maintained in this section for the duration of the permit.

SECTION VII

AUTHORIZED NONSTORMWATER DISCHARGES

Periodically, water discharges from sources other than storms are combined with stormwater associated with industrial activity at the installation. Discharges that are authorized to enter the stormwater system without the requirement for a separate permit include the following:

- Fire hydrant flushings
- Potable water sources, including waterline flushings
- Routine external building washdown without detergents
- Pavement wash waters where spills of hazardous substances have not occurred or have been removed, and where detergents are not used
- Air conditioning condensate
- Foundation of footing drains not contaminated with process materials.

Nonstormwater discharges into a stormwater drainage system must be identified; they are the subject of another section of this SWPPP.

SECTION VIII

NONSTORMWATER DISCHARGE TESTING

The installation had no written certification that stormwater outfalls had been tested or evaluated for the presence of unauthorized discharges.

INSTALLATION ACTION REQUIRED

This section of the SWPPP documents the activities conducted to perform such testing and evaluation. Testing and evaluation must be properly attested to in a certification statement as required by the regulatory authority with jurisdiction. That certification must include the following:

- Identification of potential nonstormwater discharges
- Description of the results of any test and evaluation to assess the presence of nonstormwater discharges
- Test and evaluation method used
- Date of testing and evaluation
- Outfall(s) directly observed during the testing and evaluation.

Examples of nonstormwater discharges subject to this section include the following:

- Floor drains in manufacturing, maintenance, storage, or other facilities through which pollutants may be discharged as a result of spills, floor washing, etc.
- Process rinse waters directly piped into storm drain systems
- Sanitary sewer system cross connections
- Boiler blowdown
- Noncontact cooling water
- Cooling tower discharges.

The required certification may be accomplished by a review of facility schematics, dry weather observations, dye testing, smoke testing, or TV surveys of stormwater conveyances. The selection of the method(s) of choice is specific to the potential nonstormwater discharge design as well as the outfall locations to be observed.

Such certification may not always be feasible especially where access to an outfall, manhole, or stormwater conveyance component is not available. In this instance, this section of the SWPPP must indicate why certification was not feasible for a potential nonstormwater discharge. In addition, notification to the regulatory agency with jurisdiction may be necessary where certification cannot be achieved.

SECTION IX

SUMMARY OF POLLUTANT SOURCES

This section summarizes the narratives found in Section IV. For installations with a number of potential stormwater pollutant sources, it is practical to list only those sources presenting a reasonable risk of pollution. This allows attention to be devoted to addressing those sources with significant potential for stormwater contamination. Because Section IV addresses the facilities inspected in a narrative fashion, Section IX lists only the activities inspected, the pollutant source(s) of concern, and the specific management practices used at the time of inspection (Refer to Table IX-1).

TABLE IX-I.

SUMMARY OF POLLUTANT SOURCES

Activity	Pollutant source	Pollutants of concern	Existing management practices
Oil Storage Facility, Custer Hill Troop Area	Spills in service area from damaged hoses and fueling operations	Petroleum products	Sumps to contain spills in service area
	Leaking waste oil containers	Petroleum products	Secondary container for POL storage tanks and associated piping
	Soil erosion adjacent to storm drainage system	Soil sediment	
	Oil stains on pavement adjacent to building 8312	Petroleum products	Riprap-lined drainage
	Tank and piping corrosion	Petroleum products	
Sanitary Treatment Plant, Main Post	Soil erosion in vicinity of sludge digester	Soil sediment	
DEH Pesticide Storage Facility, Main Post – Building 348	Erosion of contaminated soil	Pesticides and soil sediment	Undergoing evaluation per CERCLA criteria
PCB Storage, Building 343	PCB or PCB equipment exposed to precipitation	Polychlorinated biphenyls	Labeling of PCB-containing items and the use of drip pans and containment curbing
DEH Machine Shop, Main Post – Building 332	Spills of waste and raw materials during storage, loading, and unloading	Antifreeze, petroleum products (e.g., diesel fuel)	Spill clean-up materials available in shop
	Exposure of waste lead-acid batteries to precipitation while in storage	Acidic electrolyte and lead	Personnel trained in spill response procedures
	Vehicle washing area	Oils and soil sediment	

Note: POL = petroleum, oil, and lubricants; DEH = Directorate of Engineering and Housing; PCB = polychlorinated biphenyls; CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act.

TABLE IX-I.

SUMMARY OF POLLUTANT SOURCES (Continued)

Activity	Pollutant source	Pollutants of concern	Existing management practices
DOL Service Division Laundry and Dry Cleaners, Main Post – Buildings 180, 181, 183	Soil contamination by solvent from yet-to-be-determined source	Perchloroethylene	Undergoing evaluation per CERCLA criteria
Southeast Funston Landfill	Soil erosion along periphery of landfill adjacent to Kansas River	Soil sediment	Vegetative cover
CMF (Building 8100)	Contamination of storm water from floor wash waters discharged to outside as a result of clogged floor drains	Waste oils and solvents	Spill clean-up material available
	Spills from satellite accumulation areas for waste materials from heavy vehicle maintenance shop	Waste antifreeze, solvents, and petroleum products	Employee training in spill response
	Discharge of floor wash from subassembly shop due to clogged floor drains	Solvents, machining coolants, and lubricants	Collection troughs for vehicular fluids, grading of floor areas toward floor drains for conveyance of spills and floor wash to designated treatment or storage systems
	Exposure of significant materials from the CMF external storage yards to precipitation; these areas include the cannibalization point, as well as the storage of fuels, sulfuric acid, and similar materials used in vehicle maintenance	Antifreeze, motor vehicle lubricants, fuels, oils, and sulfuric acid	Secondary containment for waste paint containers Work areas enclosed to prevent contact of significant materials and precipitation

Note: DOL = Directorate of Logistics and CMF = consolidated maintenance facility.

TABLE IX-I.

SUMMARY OF POLLUTANT SOURCES (Continued)

Activity	Pollutant source	Pollutants of concern	Existing management practices
Open Burning/Open Demolition Site (Range 16)	Open burning of small arms with flammable substances and erosion of covered material	Lead, copper, zinc, and soil sediment	Periodic disposal of burn residue
Armored Vehicle Battalion Motor Pool	Discharge from unit motor fuel wash racks combining with storm water runoff	Soil sediment and oils	Training of facility personnel in spill response procedures
	Leaks and spills related to material storage, maintenance, and parking	Waste oils; motor vehicle petroleum products (e.g., fuel, oils, and antifreeze)	Available inventory of spilling cleanup materials, secondary containment for hazardous waste containers, and oil-water separators
Remote Training Site (MPRC)	Hazardous waste storage area spills	Waste oils, fuels, Mogas	Personnel training in spill response
	Fueling area (tanker truck) leaks and spills		Availability of spill cleanup materials
Auto Craft Shop and Car Wash – Buildings 7753/7756	Spills and leaks from waste storage areas	Waste oils and caustic cleaning agents	Personnel training in spill response
Fire Department Training Facility, Burn Pit	Spills of waste fuel oils onto surface areas adjacent to the burn pit	Waste fuel oils	Use of oil-water separators; personnel training
	Discharge from oil-water separators during precipitation events		
Marshall Field (Buildings 741, 727, 817, 820)	Aircraft wash water combining with storm water	Oils, soil sediment, and detergents	Personnel training in spill response

Note: MPRC = multipurpose range concept.

TABLE IX-I.

SUMMARY OF POLLUTANT SOURCES (Continued)

Activity	Pollutant source	Pollutants of concern	Existing management practices
Golf Course – Buildings 5202 and 5205	Leaks and spills from the POL storage area	Diesel oil and Mogas	Personnel trained in spill response measures
AAFES Station – Building 218	Leaks and spills from waste storage area	Waste oils and lubricants	Personnel trained in spill response measures
	Spills from fueling operations	Motor fuels	Good housekeeping measures in effect

Note: AAFES = Army and Air Force Exchange Service; POL = petroleum, oil, and lubricants.

SECTION X

BEST MANAGEMENT PRACTICES IDENTIFICATION

This section identifies potential best management practices (BMPs) to be used by the installation to manage sources of stormwater pollution. BMPs will be recommended at a minimum for those sources identified in the previous section as posing a risk to stormwater run-off. BMPs in place have been referenced in the Facility Narratives (Section IV) for all facilities inspected and are also summarized in this section. Both baseline and advanced BMPs will be identified regarding their appropriate use as a means for preventing or mitigating contamination of stormwater run-off. BMPs are normally selected for implementation on the basis of a number of factors, including the following:

- Age of the facility
- Type of operations at the facility
- Physical constraints at the site
- Cost and effectiveness of the BMPs.

The EPA has categorized BMPs into two categories: "baseline" and "advanced." The advanced BMPs are further divided into two subcategories: "activity" and "site-specific." Category lists provide a menu from which one can select an appropriate BMP. Also, installations can develop BMPs that are specific to their own operations. Selected BMPs should serve to eliminate or minimize stormwater pollution resulting from installation activities.

Baseline BMPs are general practices that should be applicable to most installations. Baseline BMPs must be implemented wherever possible. Baseline BMPs are generally inexpensive and applicable to a wide variety of activities; many may already be in place as a general practice or to comply with an installation's

SOPs, spill contingency plans, or other environmental or safety and health regulations. If so, it is necessary to document these practices in the SWPPP. Baseline BMPs include the following:

- Good housekeeping
- Preventive maintenance
- Visual inspections
- Spill prevention and response
- Sediment and erosion control
- Employee training
- Recordkeeping and reporting.

A list of BMPs, both baseline and advanced, appears in the appendix of the companion document to this SWPPP. Table X-1 lists examples of existing BMPs in use at the activities inspected.

A matrix in Appendix A to this SWPPP identifies BMPs in use at the installation activities inspected and acts as a menu of additional BMPs (baseline and advanced). Those BMPs are recommended for implementation to mitigate or eliminate stormwater contamination associated with activities posing a reasonable risk of such contamination. At a minimum, the pollution prevention team (PPT) must implement stormwater management controls that include baseline BMPs and that incorporate the proper advanced site- or activity-specific practices for identified pollutant sources. The advanced BMPs recommended on the matrix can be modified by the PPT given the additional insight team members can provide relative to operations on the installation. The timetable for the implementation of BMPs is best determined by the PPT given their experience in implementing other environmental or safety and health programs at the installation. A schedule for implementing stormwater management controls, however, is recommended where appropriate (see Section XI).

The remainder of this section addresses the components of baseline BMPs and references advanced BMP alternatives recommended for sources posing a risk to stormwater.

TABLE X-1.

BEST MANAGEMENT PRACTICES

BMP	Sample location(s)
Good housekeeping	DOL Warehouses and the AAFES Service Station
Preventive maintenance	DRMO Hazardous Waste Storage
Visual inspections	DRMO Hazardous Waste Storage and Remote Training Site
Spill prevention and response	DOL Warehouses, DRMO, and Armored Vehicle Motor Pools
Recordkeeping and reporting	DRMO and Airfield JPY Fuel Storage (Building 700)
Secondary containment berms	Oil Storage Facility – Custer Hill and the DRMO Storage Area
Run-on flow diversion conveyances	Oil Storage Facility – Custer Hill
Spill containment sumps	Fueling Area – Custer Hill Oil Storage Facility
Curbing to divert run-on	Central Vehicle Wash Facility and DRMO
Container labeling	DRMO Waste Storage and CMF Waste Accumulation Sites
Equipment labeling	PCB Storage Area
Covering loading/unloading areas	DOL Warehouses
Vehicle leak inspection	DRMO Salvage Area
Waste battery drainage	DRMO Waste Battery Storage Area
Vehicle parts drainage	DRMO Vehicle Salvage Area
Grading to control run-off	DRMO Waste Storage Area
Grading to control wash waters	Central Vehicle Wash Area
Recycling	CMF Work Areas (Solvents, Batteries, and Caustic Cleaners)
Vegetative cover – erosion control	Inactive Custer Hill Landfills and Funston Landfill
Drip pans/troughs	CMF Battery Shop and Direct Support Maintenance Activity
Filtering of paint overspray	CMF Furniture and Paint Shop Spray Booth
UST level monitoring	Heavy Vehicle Maintenance Shop and Airfield JP4 Storage (Building 700)
Sloping of process area floors	CMF Radiator Repair Shop
Freeboard to avoid overflow	Custer Hill and Main Post Sludge Drying Beds
Oil-water separators	Direct Support Maintenance Activity and Airfield JP4 Fuel Storage (Building 700)

Note: DOL = Directorate of Logistics; AAFES = Army and Air Force Exchange Service; DRMO = Defense Reutilization and Marketing Office; CMF = consolidated maintenance facility; PCB = polychlorinated biphenyls; and UST = underground storage tank.

BASELINE BEST MANAGEMENT PRACTICES

A. GOOD HOUSEKEEPING

Good housekeeping should consist of programs, practices, policies, and procedures that provide for maintenance of areas that may contribute pollutants to stormwater discharges. These areas must be maintained in a clean and orderly manner to minimize the potential for stormwater pollution. The installation must develop good housekeeping SOPs for facilities with a potential risk of stormwater pollution. Such a program will be documented addressing specific actions required to implement the SWPPP, identify good housekeeping practices, and incorporate employee participation in the program implementation.

The PPT must develop the program and designate specific installation personnel to coordinate the components of the program in designated areas. Program coordinators will be responsible for the following:

- Conduct inspections of regulated installation facilities on a weekly or monthly basis depending upon the specific operations at a facility. Storage areas for raw materials and wastes should be inspected on at least a weekly basis. Inactive landfills or open burning sites can be inspected on a monthly basis or at a frequency determined by their use.
- Maintain an on-site log of inspections taking place on site and forward the results to DEH personnel or other designated personnel on the PPT, especially when action is necessary to correct deficiencies.
- Implement employee participation in good housekeeping by using posters, informational sessions at employee meetings, and training sessions.

Good housekeeping consists of the following elements that can be used as a checklist for inspections and training subject matter:

Operations and Maintenance

- Maintain clean floors and ground surfaces
- Pick up hazardous and nonhazardous waste materials regularly
- Inspect for leaks
- Ensure that employees are aware of spill cleanup procedures.

Material Storage Practices

- Provide adequate aisle space for material transfer and access for inspections
- Store containers in areas away from main traffic routes to avoid accidental spills
- Stack material to avoid damage from improper weight distribution
- Use pallets or other storage means to prevent corrosion caused by contact with moisture
- Provide adequate separation for incompatible materials.

Material Inventory Procedures

- Maintain an inventory of materials stored at each site
- Obtain an MSDS for materials requiring such documentation
- Properly label all containers in accordance with safety, environmental, and fire regulations
- Identify hazardous materials on inventory documents
- Institute a materials tracking system
- Ensure that storage areas are designed to contain spills.

Employee Participation

- Discuss good housekeeping practices in employee training programs
- Post good housekeeping procedures in appropriate locations
- Publicize good housekeeping practices on posters.

B. PREVENTIVE MAINTENANCE

A preventive maintenance program must be in effect at the installation. That program must identify equipment with an environmental protection function. The existing program can be expanded to include maintenance of stormwater devices (that do not duplicate previous efforts). The PPT is best qualified to evaluate the present program and recommend any changes. The DEH personnel on the PPT should designate a preventive maintenance coordinator for each facility with a

potential to contaminate stormwater. The preventive maintenance coordinator will be responsible for the following:

- Identify and develop an inventory of equipment/systems that upon failure could result in discharges of pollutants that could contaminate stormwater.
- Conduct inspections of equipment that could result in spills or leaks if not in proper operating condition. The frequency of these inspections depends on the operational conditions under which the equipment is used, frequency of use, and design capacity. Pressure vessels containing stored liquids should be inspected on a weekly basis while overfill devices for underground storage tanks or catch basins should be inspected monthly.
- Record inspection findings and forward a copy to DEH personnel having a preventive maintenance function. Any maintenance or repair required must be attended to via proper channels, but in no instance should faulty equipment identified during an inspection remain in use. Records must also indicate corrective action performed as a result of the preventive maintenance program.

Equipment Inspection Checklist for the Preventive Maintenance Program

- Storm water management devices: oil-water separators, catch basins, detention ponds, infiltration-sedimentation basins, and other treatment or structural BMPs
- Storm water drainage system inlets and outlets
- Storage tank gauges and level control systems
- Piping (look for signs of leaks and corrosion)
- Pumps
- Storage tanks[1]
- Process and material handling equipment.

C. VISUAL INSPECTIONS

As a supplement to the preventive maintenance program, a visual inspection program shall be implemented. These inspections can determine that other aspects of the SWPPP, such as good housekeeping measures and preventive maintenance, are

[1]Examine for corrosion, leaks, and structural damage. Perform periodic pressure testing (including ancillary piping). Testing frequency may be established by other environmental and fire protection regulations on a Federal, state, or local basis or as required or recommended by other established sources of expertise such as NFPA/API/ASTM/ANSI.

in place and are effective in reducing the potential for stormwater pollution. Personnel conducting such inspections should be designated by the PPT and should have the qualifications or training necessary to conduct inspections of facilities or equipment with a stormwater pollution prevention function. Such training will be conducted in concert with the employee training element of the SWPPP. The ultimate purpose of the visual inspection program is to

- determine that BMPs used are operating effectively and
- identify conditions that may contaminate stormwater and require corrective action to eliminate that potential.

Inspections should be conducted on at least a monthly basis for structural controls such as containment measures, treatment facilities (e.g., oil-water separators and catch basins), and other structural BMPs. Weekly inspections should be conducted for areas such as storage facilities housing virgin and waste materials stored outside, outside processing and manufacturing activities, and loading /unloading areas.

Documentation of inspections shall be maintained at the facility inspected and by DEH personnel within the PPT and the organizational unit responsible for the operations of the equipment/facility inspected. Records of such inspections shall include the date of the inspection, identity of personnel conducting the inspection, area inspected, deficiencies or potential problems noted, corrective action taken, and the personnel notified about the results of such inspections. Records must also be kept with the SWPPP for a period dictated by the regulatory agency with jurisdiction; that is normally at least a year after coverage under a stormwater permit expires.

In addition to those areas noted above, other areas to inspect include

- facilities/equipment identified in the preventive maintenance section of the SWPPP;
- areas where spills/leaks have previously occurred;
- tank farms (include underground storage tanks); and
- Waste generation, storage, and disposal sites.

Visual Inspections Checklist

Include the following observations as part of the visual inspection:

- Corroded/damaged storage drums and drums without bungs/covers
- Corroded/damaged tanks and ancillary piping (including valves and flanges)
- Damaged bags or other containers for process or waste materials
- Leaking piping, hoses, pumps, or valves
- Evidence of leaks in the vicinity of UST fill connections or vents
- Damage to structures such as dikes, walls, or curbing, or other means to divert stormwater from storage areas
- Windblown dry chemicals from operations such as waste water treatment
- Improperly maintained or overloaded dry chemical conveying systems
- Erosion measures such as vegetative seeding and siltation barriers requiring maintenance to improve efficiency.

D. SPILL PREVENTION AND RESPONSE

The installation has developed a comprehensive SPCC/ISC plan that addresses those elements required in this section of the SWPPP. The SPCC/ISC plan describes potential discharge sources, materials that may be discharged, and discharge points. The plan identifies storage, transfer, and handling facilities and operations; it evaluates their effectiveness in preventing and controlling potential discharges. The installations spill plan also references training requirements and is used as a source to provide training in spill prevention and control for those personnel requiring such training.

The depth of the SPCC/ISC plan goes beyond what is typically required by Federal, state, or Army criteria in that facilities not normally included in that plan are also included in the subject plan as a matter of good engineering practice. Recommended operating procedures for the type of spill response equipment available and spill response procedures in effect are identified for each facility. Security measures appropriate for each facility in the spill plan are also referenced in the text.

Given the comprehensiveness of the installation's SPCC/ISC plan, its incorporation into the SWPPP should fulfill that information requirement. The only additional information that may be necessary is the drainage points for those areas with the greatest spill potential for stormwater contamination. This information can be found in the Facility Narratives section of this SWPPP and from drainage system overlays (Appendix C). Such information can be tabulated and incorporated into the SPCC/ISC plan as shown in Table X-2.

E. SEDIMENTATION AND EROSION CONTROL

The Sedimentation and Erosion Control Plan for the installation is in the process of being developed by DEH Natural Resources Branch personnel. This SWPPP will be incorporated into the ITAM for the installation. The Facility Narratives section of this SWPPP contains some references to sedimentation and control issues pertinent to the installation and observations made during the site visit specific to this issue. (See Section IV.) At a minimum, installations must identify areas, that – due to topography, activities, or other factors – have a high potential for soil erosion. Installations must identify methods to limit this potential.

The appendix, "*Preparing Storm Water Pollution Prevention Plans: Guidance and Interpretation for Army Installations,*" in the companion document to this SWPPP, contains a list of the "Best Management Practices" as recommended by the EPA; that list includes sedimentation and erosion control measures as BMPs. That list is incorporated into the matrix in Appendix B of this SWPPP under the heading "Sedimentation and Erosion Control." It identifies where such BMPs either are in effect or recommended for implementation.

A Sedimentation and Erosion Control Plan (SECP) should contain the following elements:

- U.S. Geological Survey topographical maps or equivalent highlighting areas subject to erosion
- Illustrations of site surface geology and soil types
- Locations and map references for bodies of water that would be impacted by activities resulting in erosion
- SOPs for conducting construction operations on the facility that appropriately incorporate sedimentation and erosion control activities

TABLE X-2.

INSTALLATION SPILL POTENTIAL SITES

Areas with spill potential	Comments
DOL Warehouses	Spills confined to loading/unloading areas; no discharge to storm drains
Oil Storage Facility – Custer Hill	Discharge to intermittent streams in the Kansas River watershed
DRMO Hazardous Waste Storage Area	Spills confined to containment area
Waste POL Railhead Asts, Camp Funston	Spills from tank cars confined to containment area; drum storage area discharge via sheet flow to adjacent ground surface
PCB Storage – Building 343	Discharge to storm water drainage system
DEH Machine Shop Outside Storage Areas	Discharge to storm water drainage system
DEH Machine Shop	Discharge to floor drains whose ultimate discharge points require evaluation
CMF (Building 8100) External Storage Yards	Raw material storage area and cannibalization point spills can discharge into storm water drainage ditches that ultimately discharge to Wolf Canyon Creek
Armored Vehicle Battalion Motor Pool	Spills from POL storage area, waste accumulation points, and painting operations discharge to storm water drainage systems
Remote Training Site (MPRC)	Spills from the hazardous waste storage areas and fueling tanker discharge to storm water drainage systems
Auto Craft Shop and Car wash – Buildings 7753/7756	Spills from waste storage operations can discharge to storm water drains
Fire Department Training Facility, Burn Pit	Spills discharge to storm water drains
Golf Course POL Storage Area	Spills discharge to storm water drainage systems
AAFES Service Station Storage and Fueling Areas	Spills discharge to storm water drains

Note: DOL = Directorate of Logistics; DRMO = Defense Reutilization and Marketing Office; POL = petroluem, oils, and lubricants; PCB = polychlorinated biphenyl; DEH = Directorate of Engineering and Housing; CMF = consolidated maintenance facility; AAFES = Army and Air Force Exchange Service.

- Inspection criteria for construction activities subject to sedimentation and erosion controls
- Requirements for contractor compliance with installations' SECP and the inclusion of contract terms mandating adherence to the SECP
- Training requirements for installation personnel involved in construction activity regulated by stormwater permits or other Federal, state, and/or local regulations mandating sedimentation and erosion control measures for specified activities
- Guidance related to BMPs to be implemented to eliminate or mitigate soil erosion.

The practices and programs described above should be implemented within 180 days of the SWPPP implementation or in accordance with the Federal or state regulatory authority having jurisdiction.

F. MANAGEMENT OF RUN-OFF

Traditional stormwater management practices, other than those that control the source of pollutants, are designed to divert, infiltrate, reuse, or otherwise manage stormwater run-off in a manner that reduces pollutants in stormwater discharges. Some of those practices are referred to as advanced BMPs in EPA guidance documents; they are referenced in the report associated with this SWPPP and in the BMP facility matrix in Appendix B of this SWPPP. These measures are typically used to direct stormwater run-off away from areas of exposed materials or potential pollutants. They also can be used to treat stormwaters in a manner that removes pollutants. Treatment in this instance primarily involves the physical separation of the pollutant from stormwater run-off. The associated BMPs are typically structural in nature. Traditional stormwater practices include measures that either are in use or may be appropriate for use on a site-specific basis for the installation. Those practices are discussed below.

1. Flow Diversion

Flow diversion structures such as gutters, channels, drains, sewers, dikes, or graded pavement are used to channel stormwater away from industrial activities to avoid contamination. They also may be used to transport contaminated stormwater to a treatment system. Flow diversion structures are described below.

a. Storm Water Conveyances (Gutters, Channels, Drains, and Sewers)

Storm water conveyances collect run-off and direct its flow. They can be constructed or lined with concrete, asphalt, metals (e.g., culverts), riprap, or vegetation. The type of material depends on the use of the conveyance. These conveyances are most easily installed when a facility is first being constructed. Grading should be engineered to allow for the movement of run-off through the system but not to a point where erosion becomes an issue. (Energy dissipators at outlet devices may be a consideration.) These devices can be used for flow diversion from tank farms, from outside storage and manufacturing-processing areas, and from loading-unloading areas. The devices also can be used for transport to oil-water separators, catch basins, or other treatment devices.

b. Diversion Dikes

Diversion dikes are used for preventing the flow of stormwater run-off onto industrial areas. They are typically associated with a stormwater conveyance to allow for drainage of diverted stormwater. Temporary dikes can be constructed of earthen material while permanent structures are typically constructed of concrete or asphalt. Dikes can be used to divert stormwater from outside storage areas or salvage areas from outside maintenance activities (such as those associated with a motor pool).

c. Grading

Land surfaces can be graded or graded and paved to divert stormwater away from areas with potential for being contaminated. Areas amenable to grading include parking areas, fueling activities, outdoor storage areas, and vehicle washing facilities where the proper slope can direct wash water to treatment facility collection systems. In combination with covering over fueling areas, grading becomes an even more efficient way to reduce stormwater contamination.

2. Infiltration

Infiltration controls are BMPs in which the primary discharge of stormwater is through infiltration. This provides for ground water recharge; it filters certain pollutants from stormwater. Infiltration techniques can remove sediment, oil, and bacteria. Roof drainage is generally considered pollutant-free and is often infiltrated to provide ground water recharge and reduce the volume of run-off from a site.

Maintenance of infiltration devices is necessary to prevent clogging from excess sediment loading. Infiltration practices should not be used in areas where run-off is contaminated with pollutants other than sediment or oil and grease.

Infiltration practices can be divided into two categories: vegetative infiltration practices and infiltration structures.

Vegetative infiltration practices are described below.

a. Vegetated Filter Strips

These infiltration devices are slightly graded natural or artificially planted areas used for providing recharge, removing sediments and other pollutants, and reducing the velocity of stormwater moving across the terrain. The filter strips are graded to be almost level and to treat sheet flow. They do not function well on steep slopes or hills. Forested strips are preferred to vegetated strips, and regular inspections are required to ensure the proper functioning of the strips. Vegetated filter strips could be used as a buffer between parking areas and drainage to stormwater conveyances or waterways.

b. Grassed Swales

Grassed swales are vegetated channels used to transport run-off while also removing sediment by filtration. Swales reduce runoff velocity and control volume using infiltration. The vegetation in the swale acts as a filter allowing for removal of contaminants such as sediment. Grassed swales are suitable for most areas where stormwater run-off is low, where soil is permeable, and where the terrain is not steep enough to cause erosion in the swale itself. Grassed swales do not function well in construction areas because of high sediment loading.

Periodic mowing, reseeding, weed control, and removal of sediment buildup, litter, and brush are necessary. Grassed swales can be used adjacent to roadways, parking areas, or other areas where contours are fairly level so that the systems are not overwhelmed with high-velocity run-off.

Structural infiltration devices are designed to aid in the collection and infiltration of stormwater. Maintenance activities are a prominent feature associated with the proper operation of those devices. Infiltration devices can work in tandem with other structures, such as oil-water separators, prior to discharge to an

infiltration device. Infiltration structures are described beginning on the following page.

c. Infiltration Trenches

An infiltration trench is a stone-filled trench used to collect surface run-off. The run-off is diverted into shallow trenches where it either leaches into the ground or is routed through perforated underdrain pipes to an outlet or discharge point. Infiltration trenches are typically used within grassed areas such as median strips, parking lot perimeters, or swales. Infiltration trenches are designed to remove both fine sediments and soluble pollutants as opposed to large, coarse pollutants. They do not operate well in soils with a high clay content or soils that have been compacted. Pretreatment of run-off will prolong the life of infiltration trenches. This can be accomplished using buffer zones or the adding a fabric filter in the trench to remove sediment or grit-like materials. They should be inspected several times within the first month of use and annually thereafter. Grass-covered trenches require regular mowing while stone surfaces require semiannual raking to remove leaves, organic debris, and litter.

d. Porous Pavement

Porous pavement allows water to infiltrate through the surface to an underground stone reservoir. Storm water run-off filters through the reservoir into underlying soil or subsurface drain pipes. For parking areas or light access roads, porous pavement can be used on relatively level sites with permeable soils and a deep water table. They are suitable primarily for low-volume parking areas (i.e., one-quarter acre to ten acres). Maintenance is critical to the performance of porous pavement; it requires monthly inspections as well as vacuuming and sweeping at least four times each year followed by high-pressure hosing to reduce the chances of sediments clogging the upper pavement pores. Signs should be installed in porous pavement areas to prevent accidental resurfacing as well as to restrict heavy equipment from parking in the area.

3. Treatment and Detention/Retention

Treatment of stormwaters to remove pollutants can be accomplished using various techniques. The same can be said for the control of run-off in structures

designed to reduce flooding or erosion resulting from the velocity or sheer volume of run-off from certain areas.

Treatment normally involves altering physical, chemical, or biological characteristics of waste materials. From the stormwater perspective, treatment typically entails the physical separation of pollutants such as sediment. Treatment can be accomplished by using techniques such as inlet controls, sediment basins, and retention/detention ponds.

a. Inlet Controls

Inlet controls considered to provide treatment of stormwater include catch basins and oil-water separators. Catch basins reduce stormwater velocity and remove certain pollutants when properly designed. They are most effective in removing the coarsest fraction of sediment. Catch basins are located in drainage systems to allow stormwater to enter the basin through a metal grate with openings at street level. Water flows into the basin and sediment settles into a sump located below outlet piping. Water may then flow directly out of the basin through a pipe or through an oil-gas hood or trap to retain oil, gas, grease, and floatable debris within the basin. Catch basin grates need to be inspected on a monthly basis or after a specified stormwater event to ensure that inlet openings are clean of debris. Basin sumps should be inspected on a monthly basis or semiannually given the size and location of the basin. Basins with oil-gas hoods or traps need to be inspected on a monthly basis for oil or grease buildup. Where accumulation allows for discharge of these materials through outlet piping, sumps must be pumped out by licensed contractors and debris disposed of in an appropriate manner.

Oil-grease separators are below ground structures in a drainage system that collect and separates oil, gas, grease, and other floatable petroleum-based substances from stormwater run-off. Accumulated floatable materials are retained and periodically removed. Some run-off is stored within the structure to allow floating materials to separate and rise to the water's surface. A control device at the outlet allows water to flow out while floating materials are retained. Depending on the nature of the discharge to these systems, accumulated materials must be pumped from the system on a monthly, semiannual, or annual basis as a result of inspections conducted by facility personnel. Inlet control devices can be used in stormwater drainage systems adjacent to fueling operations, vehicle washing operations, drains

from manufacturing and process areas, motor pool maintenance activities, and flow from tank farms.

b. Sediment Basins

Sediment basins are frequently employed during construction activities and are normally required where run-off from a drainage area flows across a disturbed area. The basin functions by allowing sediment-laden run-off to pond in the bottom of the basin, where the suspended sediment settles. Outflow from the basin can be discharged through a riser or a rock-check dam outlet. Dewatering the basin through the use of underdrains can aid in cleaning out accumulated sediment.

c. Retention/Detention Ponds

These structures serve as post-construction stormwater management controls. A wet or dry detention pond is a basin in which stormwater run-off from a specified drainage area is temporarily stored and released to a downstream area at a controlled rate. The ponding area may be totally drained (dry) between storm events or may support an open-water area below the detention outlet. A detention pond generally consists of a large depression area normally contained by earthen dikes. The surface of the basin is vegetated if it is "dry" or partially vegetated if the structure is a wet basin. Outlet control structures consist of pipes, weirs, spillways, or boxes, and they may be fixed or adjustable. Detention ponds should be checked on a monthly basis or after a major storm event to ensure that outlets or inlets are not blocked by trash or debris. Detention ponds should be designed to specified site criteria. Outlets must be sized to control flow from a variety of storm events up to a 100-year storm. Detention ponds are applicable at installations where flooding or erosion after construction is a risk that requires control measures. Sediment will have to be removed from the basin. This should be done every 5 to 10 years depending upon the rate of sediment buildup.

A retention pond is an area in which stormwater run-off is stored and dissipated through gradual infiltration or by evaporation. The ponding area may be dry between storm events or may support a year-round water body below the retention storage level. Retention ponds also consist of a depression and earthen dikes but unlike detention ponds do not have any outlet structure for water surfaces up to the maximum design level. Emergency spillways are normally a design feature of retention ponds. They should be checked during wet weather to ensure that the

retained waters are being dissipated and containment dikes are not being overtopped. Accumulated debris and sediment within the pond should be checked at least annually and removed as necessary. Sediment accumulation needs to be monitored and removed when it adversely affects the retention volume of the pond. A valve should be included in the design to drain the pond to allow for sediment removal.

ADVANCED BEST MANAGEMENT PRACTICES

In addition to baseline BMPs that need to be routinely incorporated into the SWPPP, the installation may need to implement some advanced BMPs, some of which have been alluded to in the subsection entitled "Management of Run-off." Advanced BMPs are designed to address specific pollution sources or activities at a site. These practices are categorized as "activity-specific" or "site-specific." The implementation of these practices is dependent on factors such as the following:

- Cost and effectiveness
- Physical restraints at a given site
- Site geography
- Site operational practices
- The effectiveness of baseline practices to be employed throughout the installation for activities referenced in the SWPPP's Facility Narratives section.

The first advanced practices to consider in selecting BMPs are the ones that reduce or eliminate the generation of pollutants at the site. This initial mitigation practice is referred to as "source reduction." Source reduction initiatives include the following:

- Recycle, reclaim, or reuse
- Material substitution.

Some source-reduction practices specific for the installation are the recycling of solvents and cleaners, the use of solvents whose toxicity is less than traditional chlorinated solvents used in degreasing, or the use of powder coatings or high-solids paints as opposed to solvent-based paints. A list of BMPs for consideration in

reducing the potential for stormwater pollution at the site is included in Appendix B. The list includes baseline BMPs and site-specific BMPs.

Site-specific BMPs represent a wide range of mitigative measures that are typically constrained by site-specific conditions. They include some traditional stormwater management controls and practices. These BMPs are divided into the following categories:

- Flow diversion
- Exposure minimization
- Mitigation
- Containment
- Treatment
- Sedimentation and erosion control
- Infiltration
- Other practices.

Activity-specific BMPs are practices oriented toward common industrial activities such as the following:

- Fueling
- Maintaining vehicles and equipment
- Painting vehicles and equipment
- Washing vehicles and equipment
- Loading and unloading materials
- Liquid storage in aboveground tanks
- Industrial waste management and outside processing
- Outside storage of raw materials, byproducts, or finished products
- Salt storage.

Site-specific BMPs include the following practices listed by activity:

Fueling Stations

- Install spill and overfill protection
- Discourage topping off of fuel tanks
- Protect fueling areas from rain
- Install oil-water separators in storm drains
- Ensure spill control
- Ensure employee participation and training

Vehicle and Equipment Maintenance

- Use low-toxicity materials for degreasing and cleaning, etc.
- Avoid disposal of waste materials or floor wash to floor drains or sinks
- Drain oil filters prior to disposal
- Check incoming vehicles for leaking oils or other fluids
- Recycle batteries, solvents, and cleaning solutions where possible
- Segregate waste materials.

Painting Operations

- Prevent paint wastes from contaminating stormwater
- Use painting practices that generate minimal waste (i.e., electrostatic)
- Recycle thinner, paint, and solvents
- Segregate waste materials.

Vehicle and Equipment Washing

- Use biodegradable detergents
- Use areas designated for washing to allow for collection of waste waters for treatment prior to ultimate discharge
- Recycle wash water.

Loading and Unloading Materials

- Check loading-unloading equipment for leaks
- Cover docks to prevent exposure to precipitation
- Divert stormwater run-on from loading-unloading areas.

Liquid Storage in Aboveground Tanks

- Comply with regulations relative to spill plans, secondary containment, structural integrity, and leak-detection monitoring
- Install safeguards against accidental release.

Waste Management Areas and Outside Manufacturing

- Conduct waste-reduction assessment
- Inspect areas for spills and leaks
- Protect areas from precipitation
- Minimize run-off from land disposal sites

Outside Storage of Raw Materials, Byproducts, and Finished Products

Protect stored materials from precipitation and stormwater run-on.

Salt Storage facilities

Protect piles from precipitation and stormwater run-on.

The Facility Narratives section of this SWPPP contains reference to BMPs in place as well as BMPs recommended to reduce or eliminate the potential for stormwater run-off pollution. The matrix in Appendix B summarizes the facilities inspected, identifies facilities posing a reasonable risk of stormwater pollution, identifies the BMPs recommended for the areas of primary concern, and lists BMPs in existence or recommended for other facilities at the installation. Baseline BMPs referenced earlier in this section will be implemented as SOPs at all facilities or activities inspected, regardless of their current stormwater pollution potential.

BEST MANAGEMENT PRACTICES SELECTION

Table X-3 identifies BMPs recommended for those sources identified in Section IX of this SWPPP.

TABLE X-3.

BEST MANAGEMENT PRACTICE IDENTIFICATION

Activity	Recommended BMPs
Oil Storage Facility, Custer Hill Troop Area	Inspect hoses at fueling station for damage. Provide a trough to store hoses between use and to collect residual fuel. Provide labeling for waste storage drums and remove contents from damaged containers or provide overpacks. If waste drums will continue to be stored on site, they should be inspected on a weekly basis and not allowed to accumulate for more than 90 days. In addition, waste drums must be stored in structures that will prevent contact with precipitation and contain any spills or leaks. Provide training for drivers in spill response procedures and proper fueling methods to avoid spills. Provide oil-water separators in the storm drainage system between building 8312 and the fuel storage area and inspect them weekly. Provide erosion measures adjacent to concrete drainways in the form of riprap or equivalent measures. Given the slope of drainage channels in the tank farm, they should be lined to reduce flow velocity, and energy dissipation measures should be installed at discharge points such as headwalls, especially in the southwest area of the site. Inspect piping and tanks for evidence of corrosion and leaks. Test level gauges for accuracy and any high-level control equipment. Pressure test tanks and piping according to regulatory agency criteria or perform non-destructive tests such as using ultrasound to measure wall thickness and the integrity of welds and seams.

TABLE X-3.

BEST MANAGEMENT PRACTICE IDENTIFICATION (Continued)

Activity	Recommended BMPs
Sanitary Treatment Plant, Main Post	Seeding in combination with mulch or matting. Install siltation fence or hay bales at periphery of clarifier as interim measure.
DEH Pesticide Storage Facility, Main Post – Building 348	This area is undergoing evaluation according to CERCLA criteria. Installing a temporary impervious cover over the contaminated area would reduce the existing erosion. Consideration should be given to diverting run-off from adjacent areas through the use of diking or similar means.
PCB Storage – Building 343	Enclose the front of the building to prevent precipitation from contacting stored PCB equipment or liquid in drip pans. The enclosure can be constructed of wood and sheet metal or the existing entrance can be provided with sheeting durable enough to prevent windblown precipitation from contact with stored items. The base of the structure must be sealed to prevent run-off from entering the structure from ground level. Because the existing slope of the structure is toward the front, either a grated sump to collect spilled material during testing or transfer or a containment berm that is contoured to allow for entry of material handling equipment is recommended.
DEH Machine Shop, Main Post – Building 332	Provide roofing and secondary containment for both waste and raw materials stored outside this building. This may be accomplished by purchasing portable storage structures that allow for loading/unloading from pallets as well as a means for preventing contact with precipitation and providing spill containment. An alternative is to construct a storage area with a sealed floor, concrete block walls, and a roof with an over-hang to prevent precipitation from contact with stored materials. The entrance to such a structure would be graded to contain spills. Drums in the current storage area must be inspected on a daily basis for proper labeling and corrosion or other damage that allows for leak potential. A record must be kept of the results of such inspections, and measures such as a material transfer or overpacking must be used as necessary.

TABLE X-3.

BEST MANAGEMENT PRACTICE IDENTIFICATION (Continued)

Activity	Recommended BMPs
DEH Machine Shop, Main Post – Building 332 (Continued)	Provide similar protection for batteries stored in the area or if a dedicated storage structure is built, batteries can be stored in that structure. Provide a valve that can be secured in the locked position to avoid overfilling of the waste oil UST once liquid level is at maximum capacity. Regrade or provide containment for wash waters from the vehicle washing area. This measure is necessary to prevent direct discharge to the storm drain network along Marshall Boulevard. This will also prevent contamination of storm water run-off that is directed to the Marshall Boulevard storm water drain system. If wash water discharge is linked to storm water drainage, determine the feasibility of connection to the sanitary sewer. If such a connection cannot be made from an engineering perspective, then a catch basin with a sediment trap and oil-water separator must be installed in the storm water network prior in the vicinity of the storm drain at the entrance to this facility. An alternative is the installation of an oil-water separator and sediment controls at the discharge point at the vehicle wash area. Soil removed from grated drainage sumps in the vehicle washing area must be either containerized or covered to prevent oils entrained in the soil from precipitation.
DOL Laundry and Dry Cleaners, Main Post – Buildings 180, 181, and 183	These facilities and grounds are currently undergoing evaluation according to CERCLA criteria. In the interim, soil piles from excavations resulting from soil gas testing should be protected from precipitation by the use of tarps secured with sandbags. In addition, run-off from building 183 roof leaders should be discharged directly to storm drains to avoid contact with contaminated soils on the south slope of this facility.

TABLE X-3.

BEST MANAGEMENT PRACTICE IDENTIFICATION (Continued)

Activity	Recommended BMPs
Southeast Funston Landfill	Stabilize the river bank with such measures as riprap and gabions, or vegetative techniques, as appropriate.
CMF (Building 8100)	Conduct daily inspections of floor drain inlets to avoid clogging these devices and the subsequent discharge of contaminated wash waters outside the building. This applies throughout the facility especially in areas such as the subassembly shop where wash waters can be discharged outside the work area. Conduct daily inspections of satellite waste accumulation areas serving the Heavy Vehicle Maintenance Shop to determine that containers are properly identified and structurally sound. Satellite waste accumulation areas must be provided with secondary containment. Inspect all vehicles entering the external storage yards for leaks prior to entry into parking areas pending service. All scrap vehicles must be drained of fluids prior to cannibalization of parts. This policy can be enforced at a controlled entry point as is done at the DRMO. Provide storage for raw materials, waste chemicals, or other items that either pose a leak or spill risk or are exposed to precipitation with subsequent contamination of run-off. Storage should consist of a combination of covering for protection from direct exposure to precipitation as well as containment for spills and leaks and to avoid contact with storm water run-off in the storage yards. All containers must be inspected daily to determine that the contents are clearly identified and any labels indicating the hazardous nature of the containers' contents are properly affixed. Install oil-water separators in the storm drainage system for the parking area in the external storage yards. Reinforce the drainage ditches outside the fence line around the parking area with concrete sections to reduce erosion and effectively divert storm water run-on from the parking area.

TABLE X-3.

BEST MANAGEMENT PRACTICE IDENTIFICATION (Continued)

Activity	Recommended BMPs
Open Burning/Open Demolition Site (Range 16)	Remove burn residue immediately after burning operations. Cover the site after removal operations and reduce erosion potential by diverting run-on with earthen berms and providing vegetation for cover material. Install hay bales or siltation fencing between the burn area and drainways to state waters.
Armored Vehicle Battalion Motor Pool	Control unit motor pool wash waters to avoid untreated discharge combining with storm water run-off. This may be accomplished by the installation of curbing to prevent run-on from storm water as well as sloping of wash rack areas to contain wash water to the best degree possible. Wash water can then be directed to collection drains with oil-water and sediment separation devices prior to discharge to storm sewer systems. The use of detergents should be avoided. If a connection to sanitary system piping is feasible, this is preferred over discharge to storm water networks after oil-sediment separation. The use of phosphate-free, biodegradable detergents would be acceptable given discharge to a sanitary treatment system. In-ground sumps need high-level controls to prevent overfilling. These can be in the form of alarms triggered by flotation devices or similar means alerting maintenance bay personnel that collection devices require service. POL storage areas require protection from precipitation and spill containment. This can be in the form of roof covering and containment curbing with sloped entry for material handling equipment. Oil-water separators need to be installed in storm drainage systems receiving run-off from parking facilities.

TABLE X-3.

BEST MANAGEMENT PRACTICE IDENTIFICATION (Continued)

Activity	Recommended BMPs
Remote Training Site (MPRC)	Install a waste accumulation area with cover and spill containment. Inspect the mogas tank truck for leakage at hose connections, valves, pumps, and the tank body itself. This should be done on at least a weekly basis. The tanker should be inspected for signs of corrosion on at least a monthly basis and subjected to pressure testing annually according to protocol developed by NFPA or API standards or state, local, or installation-level fire protection personnel as they relate to tanker trucks used to dispense flammable or combustible liquids. Drip pads or pans should be in place beneath the fueling tanker while it is not in use to contain leaks or spills and to indicate their presence. The aboveground fuel storage tank requires containment that provides control for at least 110 percent of tank volume. The tank, piping, valves, gauges, and hoses require inspection for leaks, corrosion, pitting, or other factors that could lead to spills or leaks during their use. Support stanchions also should be inspected at least monthly. The tank itself should be subject to annual nondestructive testing to determine its suitability for continued use. Provide dispensing nozzles and interlocked pumps to discontinue pumping once vehicle tanks are filled.
Auto Craft Shop and Car wash – Buildings 7753 and 7756	Provide an adequate storage area for waste solvents, cleaning agents, oils, and other waste materials. Storage should prevent contact with precipitation and run-off as well as contain spills. Provide oil-water, oil-sediment separators for wash water. Connect discharge from these systems to a sanitary treatment system line where possible. If this can be accomplished, use detergents that are phosphate-free and biodegradable. Consider collecting wash waters for recycling after oil-sediment removal.

TABLE X-3.

BEST MANAGEMENT PRACTICE IDENTIFICATION (Continued)

Activity	Recommended BMPs
Fire Department Training Facility, Burn Pit	Arrange for spill clean-up equipment to be available prior to each training session in the event of spills onto surfaces adjacent to the pit. Report the occurrence of spills as required by installation protocol. Arrange for the proper cleanup, containerization, and disposal of contaminated materials and record such events. Inspect the oil-water separator prior to each training event and remove accumulated oils as necessary to ensure the proper operation of this equipment. Perform stick testing of the waste fuel tank prior to training events to avoid overfilling. Where necessary, according to regulation, provide for overfill protection for this tank.
Marshall Airfield – Buildings 727, 741, 817, and 820	Provide curbing for containment of aircraft wash waters and to prevent the entry of storm water onto this area. A collection trough in the wash area should be constructed to transport wash water to a sanitary treatment system in lieu of discharge to storm water transport conveyances. Detergents must be phosphate-free and biodegradable. If such a connection cannot be made, wash water discharge must be treated by catch basins or oil-water separators prior to storm water system discharge. Treatment must include the removal of sediment. Detergent use must be curtailed if discharge is to continue into storm drains.
Golf Course – Buildings 5202 and 5205	Install spill containment under the POL storage tanks sufficient to contain the volume of the tank with the largest capacity. Inspect tanks, piping, hoses, nozzles, and support structures at least weekly for leaks, corrosion, pitting, etc., and to maintain records of such inspections. The tanks must be inspected annually for wall thickness and pressure-tested if feasible by qualified personnel.

TABLE X-3.

BEST MANAGEMENT PRACTICE IDENTIFICATION (Continued)

Activity	Recommended BMPs
AAFES Service Station – Building 218	Provide secondary containment for waste storage containers. Protection for exposure to precipitation in the form of roof covering is also recommended. Portable enclosures for drum storage are acceptable. Provide cover over the fueling areas and install signs discouraging "topping off." Install pump-nozzle interlocks that allow for automatic shutoff of fuel when tanks are filled. Install drip pads in the fueling area. Consider regrading surface areas to divert run-off from the fueling area. Install oil-water separators in the storm drain network down the gradient from the station.

SECTION XI

BEST MANAGEMENT PRACTICE IMPLEMENTATION PLAN

Implementation of complex BMPs requires a detailed programming process under the Army's budget system. This implementation plan commits Fort X to the completion of BMPs in various fiscal years, with initial implementation steps (i.e., the project identification) being accomplished during the current fiscal year. Under the provisions of most Federal or state permit requirements, baseline BMPs must be implemented during the current fiscal year. Fort X will be in compliance with regulatory provisions as long as the necessary actions are underway to complete implementation of BMPs by the times specified in Table XI-1.

TABLE XI-1.

BEST MANAGEMENT PRACTICE IMPLEMENTATION PLAN

Best management practices	Fiscal years				
	1993	1994	1995	1996	1997
Baseline	X				
Inspection of fueling hoses	X				
Waste storage drum labeling	X				
Satellite point inspection program	X				
Oil-water separator inspection program	X				
Driver fueling and spill training	X				
POL yard tank testing		X			
Installation inspection SOP	X				
Cannibalization point SOP	X				
OB/OD site MOU and SOP	X				
MPRC inspection program	X				

Note: POL = petroleum, oil, and lubricants; SOP = standard operating procedure; OB/OD = open burning/open demolition; MPRC = multi-purpose range complex; and MOU = Memorandum of Understanding.

TABLE XI-1.

BEST MANAGEMENT PRACTICE IMPLEMENTATION PLAN (Continued)

Best management practices	Fiscal years				
	1993	1994	1995	1996	1997
Structural					
Fuel hose storage trough	X				
Satellite point structures		X			
Oil-water separators					
POL facility		X			
CMF parking area		X			
Unit motor pools					X
Unit washracks			X		
Auto craft			X		
Airfield bulk tanks	X				
Airfield other			X		
AAFES stations				X	
Conveyance erosion control			X		
Tank farm drain upgrades			X		
Erosion control bale placement	X				
Erosion control seeding		X			
CERCLA site cover	X				
CERCLA site roof lead modification	X				
CERCLA site diking system			X		
PCB storage building interim upgrade		X			
PCB building replacement				X	
DEH Machine Shop curbing	X				
DEH Machine Shop pallets		X			
DEH Machine Shop cover and containment			X		
DEH Machine Shop battery storage area		X			
DEH Machine Shop UST overfill valve	X				
DEH Machine Shop washrack drain			X		
Funston erosion control: riprap	X				

Note: CMF = consolidated maintenance facility; AAFES = Army and Air Force Exchange Service; CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act; PCB = polychlorinated biphenyls; DEH = Directorate of Engineering and Housing; and UST = underground storange tank.

TABLE XI-1.

BEST MANAGEMENT PRACTICE IMPLEMENTATION PLAN (Continued)

Best management practices	Fiscal years				
	1993	1994	1995	1996	1997
Structural (Continued)					
Funston erosion control: seeding			X		
Curbing for CMF storage area		X			
OB/OD site berms/swales			X		
Washrack rerouting to sewer lines					X
Unit motor pool UST fill protection		X			
Unit motor pool POL structures			X		
MPRC satellite accumulation point	X				
Auto craft storage area			X		
Marshall Field curbing				X	
Airfield washwater collection system					X
Marshall Field curbing				X	
Golf course pesticide containment			X		
AAFES stations storage points		X			
AAFES stations pump interlocks			X		
AAFES stations curbing				X	
AAFES stations covered fueling					X

SECTION XII

EMPLOYEE TRAINING

Employee training is an integral part of the stormwater management program. Employees at all levels of responsibility must be informed about the components of the SWPPP. At a minimum, training should address topics such as

- spill prevention and response,
- good housekeeping, and
- material management practices.

Baseline BMPs will be in effect for all facilities inspected regardless of the stormwater risk assessment potential attendant to a facility or activity. This approach provides some assurance that facilities with a low risk potential will institute programs that should prevent them from becoming sources with a higher risk of stormwater contamination.

Training must be documented, and a schedule for training activities required to meet the goals of the SWPPP will be developed by the pollution prevention team.

The Environmental Office's training officer will perform a key role in implementing training. Existing plans such as the SPCC/ISC plans have already provided training for installation personnel. To avoid redundancy, this training can suffice for certain components of the SWPPP such as spill prevention and response. Material handling training (as provided in right-to-know regulations) and hazardous waste contingency training have also provided training required in the SWPPP. This applies to personnel from the DoL warehouse, DRMO, consolidated maintenance facility, main pol, tank farm, and the fueling station.

SECTION XIII

RECORDKEEPING

A description of incidents such as spills or discharges of a reportable nature is currently maintained by the installation's Environmental Office staff. That documentation can be combined with other recordkeeping activities required under this SWPPP. The following records must be established and copies maintained at the facility/activity level (and original documents must be retained by the pollution prevention team personnel):

- Inspection activities
- Preventive maintenance of SWPPP equipment or facilities
- Stormwater sampling and analyses results
- Training.

Spill reports must include the date, time, weather conditions, cause, response actions, and notification action relative to the incident.

Inspection and maintenance recordkeeping can consist of

- field notebooks,
- timed and dated notebooks,
- video tapes, and
- drawings and maps.

Records must be updated regarding

- name and location of receiving waters and
- number and location of discharge points.

Records of spills, leaks, or other discharges, inspections, and maintenance activities must be retained for at least 1 year after coverage under a permit expires or as required by the regulatory agency with jurisdiction.

SECTION XIV

COMPREHENSIVE SITE COMPLIANCE EVALUATION

The pollution prevention team must, along with any other designated personnel, conduct an installation compliance evaluation at least annually. Those personnel conducting the inspection are required to do the following:

- Inspect stormwater drainage areas for evidence of pollution entering the drainage system.
- Evaluate the effectiveness of BMPs to reduce pollutant loadings.
- Inspect any equipment necessary to implement the SWPPP, such as spill response equipment.
- Revise the SWPPP as necessary within 2 weeks of the inspection.
- Implement any necessary changes within 12 weeks of the inspection.
- Prepare a report summarizing the inspection's results and followup actions taken, the date of the inspection, the names of personnel conducting the inspection, incidents of noncompliance (or certify that the facility is in compliance) with the SWPPP.
- Sign the report in accordance with Section XVI and file it with the SWPPP.

SECTION XV

SALT STORAGE

Salt used for deicing is stored on the installation at one location. That location was on the Main Post in the vicinity of the sludge drying beds. The piles were not covered at the time of the inspection. However, there are no discrete conveyances to discharge stormwater contaminated with salt into state waters. Any discharge into the Kansas River would be in the form of sheet flow.

However, in the interest of establishing good practices, the piles will be covered when there is no activity such as adding to or removing salt from the pile.

SECTION XVI

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or of those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

_____

Signature Block
Chief, Environmental Compliance Division

The individual above is empowered to make this certification based on written delegation of authority from the installation commander, provided as Appendix A to this document.

APPENDIX A

DELEGATION OF CERTIFICATION AUTHORITY

DELEGATION OF CERTIFICATION AUTHORITY

This section can be used to include a statement signed by an installation commander to delegate signatory authority for NOIs, SWPPPs, etc., to an individual other than one listed in the regulations. This individual should have some command authority, e.g., Director, DEH, and have responsibility for compliance with environmental issues such as stormwater.

APPENDIX B

FACILITY INSPECTION CHECKLIST

Facilities

	Good housekeeping							Source reduction	Exposure minimization						
	Operations and Maintenance	Storage	Inventory	Employee focus	PM of SWPPP equipment	Visual inspections	Spill prevention and response			Containment	Diversion	Detention	Mitigation	Other practices	Exposure and erosion control
Sites subject to erosion															
Tank crossings															
Range roads															
Steeper hillsides															
Outfalls															
Storm water conveyances															
Other water outfalls (from waste treatment plants)															
Unofficial (wash points)															
Erosion issues															
Excessive silt															
Undermining control structures															
General erosion control measures															

Note: GS = general support; DS = direct support; DEH = Directorate of Engineering and Housing; DOL = Directorate of Logistics; HW = hazardous waste; O/W = oil-water; POL = petroleum, oils, and lubricants; AAFES = Army and Air Force Exchange Service; (D) = look for these items at drinking water plants; (S) = look for these items at domestic waste water treatment plants; I&I = inflow and infiltration; TSDF = Treatment, Storage, and Disposal Facility; DRMO = Defense Reutilization and Marketing Office; CS = [name of chemical]; OB/OD = open burning/open demolition; PCB = polychlorinated biphenyls; SWPPP = Storm Water Pollution Prevention Plan.

Facilities

	Good housekeeping							Source reduction		Exposure minimization					
	Operations and Maintenance	Storage	Inventory	Employee focus	PM of SWPPP equipment	Visual inspections	Spill prevention and response			Containment	Diversion	Detention	Mitigation	Other practices	Exposure and erosion control
Site remediation (CERCLA/RCRA)															
Surface water runoff															
Storage of hazardous material															
Storage of contaminated equipment															
Decontamination facilities															
Steam electric power generating facilities															
Photographic processing facilities															
Training aids support center															
AAFES/concession facilities															
Craft shops															
Coal storage areas															
Salt storage areas															
Golf course															
POL products (diesel and gas)															
Pesticides/fertilizers (see elsewhere)															
Mower storage area															
Mower and cart maintenance															

Note: See page B-13 for listing of definitions.

Facilities

	Good housekeeping							Source reduction	Exposure minimization							
	Operations and Maintenance	Storage	Inventory	Employee focus	PM of SWPPP equipment	Visual inspections	Spill prevention and response			Containment	Diversion	Detention	Mitigation	Other practices	Exposure and erosion control	
Pesticide/fertilizer storage																
Storage areas																
Mixing site																
Waste disposal																
Landfills																
Active sites/cells																
Load transfer and deposit																
Leachate collection system																
Inactive sites/cells																
Vegetative cover adequacy																
Contaminant runoff																
Erosion issues																
Incinerators																
Load transfer points																
Fly ash deposits																
Residue handling points																
Filter disposal																
PCB storage/use areas																
PCB test/sample areas: containment																
Storage areas: containment																
PCB items in use: containment																
Laundries																

Note: **See page B-13 for listing of definitions.**

Facilities

	Good housekeeping							Source reduction	Exposure minimization							
	Operations and Maintenance	Storage	Inventory	Employee focus	PM of SWPPP equipment	Visual inspections	Spill prevention and response			Containment	Diversion	Detention	Mitigation	Other practices	Exposure and erosion control
Small quantity operations															
Upholstery (lacquers and adhesives)															
Canvas repair (adhesives and water-repellent coatings)															
Electronics repair (solvents, solder, and brazing materials)															
Class IX parts storage area (miscellaneous fluids)															
Gas chamber															
CS dissolved in rainwater runoff															
CS storage area															
Open burning/open demolition site															
Ejection from OD directly to water conveyance															
Runoff control from OD piles															
Runoff control from OB pits/pans															
OB residue escape or runoff															
Ammunition supply point															
Storage igloos															
Warehouse area															
Forklift storage and maintenance															
Ammunition maintenance															
Supply and services															
Warehouses															
Railhead offload points															
Truck delivery points															
Stored POL or other regulated substances															
Internal accident exposure															
Outdoor accident/spill exposure															

Note: **See page B-13 for listing of definitions.**

Facilities

	Good housekeeping		Operations and Maintenance		Storage		Inventory		Employee focus		PM of SWPPP equipment		Visual inspections		Spill prevention and response		Source reduction		Exposure minimization		Containment		Diversion		Detention		Mitigation		Other practices		Exposure and erosion control	
Metalwork shops																														
Metal residue from machines																														
Subassembly shop																														
(See Maintenance)																														
Outdoor storage yards																														
Motor parks																														
Aircraft parking aprons and hangars																														
Maintenance facilities																														
Unit motor pools																														
Cannibalization point (specified regulated facility)																														
DRMO																														
TSDF																														
Storage yards																														
Recycling operations																														
Metal scrap																														
Fluid drips and leaks																														
Battery storage																														
Surface drainage																														
Outdoor Facilities (HW point, washrack, etc.)																														
Accident safety of outdoor storage of materials																														
Oils																														
Acids and caustics																														
Fuel drums																														
Accumulation points																														

Note: **See page B-13 for listing of definitions.**

Facilities

	Good housekeeping							Source reduction		Exposure minimization					
	Operations and Maintenance	Storage	Inventory	Employee focus	PM of SWPPP equipment	Visual inspections	Spill prevention and response			Containment	Diversion	Detention	Mitigation	Other practices	Exposure and erosion control
Aerosols and paints															
Paint shop															
Furniture shop (lacquers)															
Work area – spill escape potential															
Storage room – spill escape potential															
Paint spray booth															
Ventilation system emission points															
Floor drainage															
Overspray removal															
Filter disposal															
Waste or used paint containers															
Disposal of paint filter material															
Filters															
Water curtain															
Paint wastes															
Sanding wastes															
Small arms repair															
Solvent storage and disposal															
Rags and material															
Heavy vehicle maintenance shops															
(See Maintenance)															
High volume paint bays															
(See elsewhere)															
Radiator repair shop															
(See Maintenance)															

Note: **See page B-13 for listing of definitions.**

Facilities

	Good housekeeping							Source reduction	Exposure minimization							
	Operations and Maintenance	Storage	Inventory	Employee focus	PM of SWPPP equipment	Visual inspections	Spill prevention and response			Containment	Diversion	Detention	Mitigation	Other practices	Exposure and erosion control
Heavy-duty vehicle washing															
AAFES car wash															
Central vehicle wash facility															
Unit motor pool washracks															
DEH vehicle wash facility															
Water discharges															
Oily discharges															
Detergents															
Sediment															
Consolidated maintenance facility															
(See separate activities in following portions of list)															
Battery shop															
Receipt and delivery															
Storage															
Battery recharge															
Emptying batteries															
Storage of neutralizing soda															
Disposal of neutralizing waste															
HW collection point (see elsewhere)															

Note: **See page B-13 for listing of definitions.**

Facilities

	Good housekeeping							Source reduction		Exposure minimization						
	Operations and Maintenance	Storage	Inventory	Employee focus	PM of SWPPP equipment	Visual inspections	Spill prevention and response			Containment	Diversion	Detention	Mitigation	Other practices	Exposure and erosion control	
Water treatment plants																
Sewage treatment plant																
Drinking water treatment plant																
Sludge drying beds																
Chemical use and storage																
(D) Coagulation																
(D) pH control																
(D) Fluoride																
(S) Flocculation																
(S) Secondary treatment chlorination																
(S) Tertiary treatment																
Upset monitoring																
(S) Unauthorized intake control																
I&I Impact																
Filter backwash discharge																
Sludge transfer piping																
Sludge storage and disposal																
Sludge effluent return system																
Lagoon capacity and freeboard																
Chemical delivery and unloading																
Pump machinery and engines																
Oil																
Fuel																
Cleaners																
Maintenance activity																
(S) Discharge point																

Note: **See page B-13 for listing of definitions.**

Facilities

	Good housekeeping							Source reduction		Exposure minimization						
	Operations and Maintenance	Storage	Inventory	Employee focus	PM of SWPPP equipment	Visual inspections	Spill prevention and response			Containment	Diversion	Detention	Mitigation	Other practices	Exposure and erosion control	
Bulk POL storage																
Airfield JP4 Fuel storage and issue point																
POL Storage Yard																
Waste POL rail car yard																
Tank leaks																
Pipes																
Fuel dispensing points																
Waste fuel tank																
Tank refuel by tank trucks																
Pump equipment																
Condition of hoses																
Drip control equipment and facilities																
HW collection points (see elsewhere)																
Fire training facility																
Burn pit																
Fuel stations																
AAFES service station																
Motor pool fuel points																
Vehicle fueling																
Bulk refueling																
Storage of products																
Customer use of oil, antifreeze, etc.																
Vehicle maintenance (see elsewhere)																
Parking areas for fuel trucks																

Note: **See page B-13 for listing of definitions.**

Facilities

	Good housekeeping							Source reduction	Exposure minimization							
	Operations and Maintenance	Storage	Inventory	Employee focus	PM of SWPPP equipment	Visual inspections	Spill prevention and response			Containment	Diversion	Detention	Mitigation	Other practices	Exposure and erosion control
Oil changes															
Lubrication/grease															
Antifreeze															
Floor washing															
Vehicle washing (see elsewhere)															
Clean oils, etc., storage															
Waste oils, etc., storage															
HW collection point (see elsewhere)															
Painting (see elsewhere)															
Cleaning devices drainage															
Fueling points (see elsewhere)															
Functionality of designated O/W separators															
Battery maintenance															
Used oil filters															
Draining															
Disposal															
HW collection point															
Storage area															
Use practices															
Loading and removal															

Note: **See page B-13 for listing of definitions.**

Facilities

	Good housekeeping							Source reduction	Exposure minimization							
	Operations and Maintenance	Storage	Inventory	Employee focus	PM of SWPPP equipment	Visual inspections	Spill prevention and response			Containment	Diversion	Detention	Mitigation	Other practices	Exposure and erosion control	
General																
Spill control equipment and materials																
Used material disposal																
Vehicle leaks and drips																
Identify all floor drains																
Drainage routes where there is no drain system																
Floor washing																
Integrity of flooring/surfaces/curbing																
Motor maintenance																
Auto craft shop																
Airfield ground vehicle maintenance																
Heavy vehicle maintenance shop (GS)																
Subassembly repair shop (GS)																
DS maintenance																
Unit-level maintenance																
Remote site training activity/barracks																
DEH maintenance yard																
DOL maintenance yard																
Radiator repair																
Antifreeze draining																
Caustic tanks																
Soldering points																
Rinse tanks																
Engine and transmission maintenance																
Solvents																
Oils and fluids																

Note: **See page B-13 for listing of definitions.**

APPENDIX C

INSTALLATION TOPOGRAPHIC MAP AND OVERLAYS

REPORT DOCUMENTATION PAGE

Form Approved
OPM No.0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources gathering, and maintaining the data needed, and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.

1. AGENCY USE ONLY *(Leave Blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	February 1994	Final

4. TITLE AND SUBTITLE

"Fort X" Stormwater Pollution Prevention Plan

5. FUNDING NUMBERS

C MDA903-90-C-0006

PE 0902198D

6. AUTHOR(S)

Robert J. Baxter
Douglas M. Brown

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Logistics Management Institute
6400 Goldsboro Road
Bethesda, MD 20817-5886

8. PERFORMING ORGANIZATION REPORT NUMBER

LMI– AR305RD1

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

Mr. Ron Nichols, FCEN-LED-E
HQ, U.S. Army Forces Command
Bldg. 200
Fort McPherson, Georgia 30330

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT

A: Approved for public release; distribution unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT ***(Maximum 200 words)***

On 9 September 1992, the Environmental Protection Agency issued its National Pollutant Discharge Elimination System general permit for industrial stormwater discharge. Federal facilities must conform to the requirements of the permitting agencies (state or Federal).

To facilitate the preparation of the Stormwater Pollution Prevention Plan (SWPPP) required by permits, this report provides a sample plan based on a risk management approach for stormwater-related discharges. This document is to be used by contractors as a mechanism to assist in the development of SWPPPs.

The report identifies regulated activities and, based on the risk of contamination of stormwater discharged from these sources, identifies Best Management Practices necessary to mitigate such occurrences.

14. SUBJECT TERMS

Stormwater, Best Management Practices, BMPs, pollution prevention plans

15. NUMBER OF PAGES

161

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	UL